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Original Articles

THE USE OF ANTI-DEPRESSIVE DRUGS

By

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THE diagram, which has no relation to brain structure, represents the way in which, in terms of function, mood is regulated by a mechanism which is disordered in cases of pathological elation and depression. It illustrates the points in the regulation mechanism at which physical treatment with different agents can be applied. This theoretical model reconciles the following observations:

1. E.C.T. produces little immediate effect at first in severe cases, but the depression *gradually* lifts and may proceed to elation if E.C.T. is not discontinued. Until the normal mood level is reached there is a slow relapse after each treatment. If treatments are spaced out too far, only temporary improvement occurs.
2. The indirect anti-depressive drugs (including the amino-oxidase inhibitors) such as Tofranil, Nardil, Cavodil and Niamid produce their effects after a period of time and then only if the dose is higher than a threshold level peculiar to each individual. The amino-oxidase-serotonin theory is not referred to here, as it is not established in detail.
3. Amphetamines and sympatheticomimetic (direct anti-depressive) drugs give symptomatic relief *at once*, but only in the less severe depressives. The relief occurs only while the drug is circulating in adequate concentration.
4. Lithium salts have a highly specific but purely symptomatic action on pathological elation. Once the concentration of lithium falls below threshold, elation reappears. Lithium salts do not produce characteristic depression in normal subjects.

* Among the papers left by Professor Kennedy at his sudden and untimely death, was one which bore evidence of more drafting and re-drafting than any other. He had spoken of his belief that the theoretical model he was attempting to construct might prove to be his most important contribution to psychiatry. Unhappily this was not to be. What he did leave, however, is being published here as a fragmentary contribution by Alexander Kennedy to our understanding of the treatment of depression.

Denis Leigh

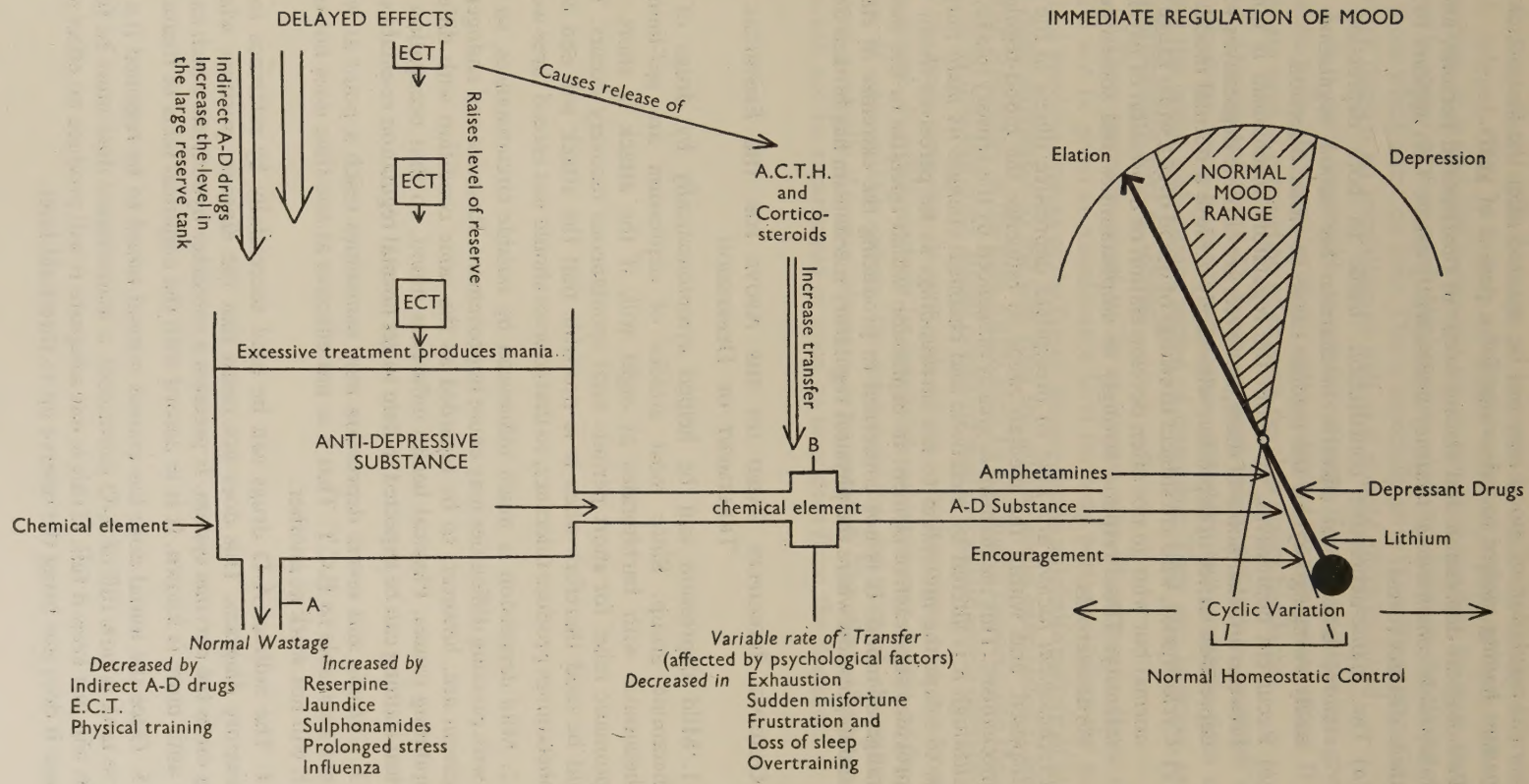
5. The depression brought on by reserpine comes on rapidly in predisposed subjects, but only after the drug has been given for weeks or months. There is no immediate depressing action. Once depression is established, it does not clear up at once if reserpine is stopped.
6. Depressives may get complete relief temporarily if they have to act in a crisis. A.C.T.H. and corticosteroids produce euphoria in some normal people. They are adjuvant to E.C.T. in depressives. They do not produce remission in severe depressives.

Theoretical Basis of the Diagram

In this theoretical visual statement, the following assumptions are made:

1. That the regulation of the prevailing mood-state within normal limits is controlled by a homeostatic mechanism which has or has had a survival value. Variations in mood are normal within certain limits and may show diurnal, menstrual and seasonal fluctuations. Pathological elation and depression may or may not show a comparable periodicity.
2. When pathological elation and depression occur, the normal operation of mood control is evidenced only by the periodic variations usually seen. There is evidence that some part of this mechanism is located in the central regions and that the thalamus and mamillary bodies are involved in it.
3. The hypothalamic-pituitary mechanism which is responsive to environmental changes and controls the bodily state by both autonomic and endocrine pathways is concerned with mood change within healthy limits. Neither steroids nor sympatheticomimetic drugs, however, can relieve pathological depression or elation.
4. A substance exists (A-D), the lack of which causes depression (or a balance between substances is disturbed). Reserpine, sulphonamides, antimony salts and jaundice lower the level of this substance until none is available for maintaining the normal mood. When this state is reached, direct antidepressives such as amphetamine cease to be effective, but indirect antidepressives will work in time.
5. E.C.T. and the amino-oxidase inhibitors must either increase the production of anti-depressive substance or slow its normal rate of wastage.
6. The rate at which A-D substance is available to the rest of the nervous system is influenced over short periods by adrenaline and noradrenaline, and over longer periods by corticosteroids. Once the mood-state has got well beyond the normal range limits, these substances have little effect.
7. Attacks of depression and elation are almost always self-limiting in time. Physical treatment cannot affect the constitutional tendency, but can cause each attack to remit earlier than it would do spontaneously.
8. The sudden onset of many attacks of severe depression suggests that there is some sort of *threshold effect*. The results of using anti-depressive drugs which produce no improvement for several days before remission occurs also suggest that a threshold level of some substance is necessary before recovery takes place. The effect of drugs such as reserpine which destroy A-D gives the same impression.
9. Once, as the result of treatment, the mood-state reaches the normal range, *the normal homeostatic mechanism can usually take over again.* The speed at which this occurs varies. In the manic-depressive cyclical constitution,

EFFECT OF PHYSICAL TREATMENT ON PATHOLOGICAL MOOD STATES



Regulation of Mood has Neural (immediate) and Chemical (delayed) elements.

normal regulation of mood may not be restored after the first attack, the patient having violent mood-swings for a period of years.

10. Pathological depression and elation occur in predisposed persons, and an inheritable *constitutional tendency* undoubtedly exists. This appears to take three distinct forms:

    (*a*) The manic-depressive constitution, liable to both depression and elation, lacking an effective mechanism for mood regulation and easily swinging beyond the median range in either direction.

    (*b*) Recurrent depressives, in whom the regulatory mechanism is normal between attacks. Some of these, however, are chronic depressives whose depression varies in depth but who rarely achieve a normal mood.

    (*c*) Cyclothymes, who are subject to swings of mood over a wider range than normal but who do not often develop elation or depression of psychotic intensity. These respond strongly to amphetamines and sometimes to corticosteroids.

11. *Psychological factors* are able to precipitate depressive illness in the predisposed, and within the median range to influence the mood-regulating mechanism. This mechanism is greatly influenced by the sensory intake, and although it is altered by metabolic and chemical changes its main purpose is to adapt the individual to his surroundings as he perceives them. This provides the reactive element in depression which operates in the median range of mood. It is not concerned in producing the extremes of elation and depression where the physical regulatory mechanism has broken down.

Guiding Principles Based on the Above for the Empirical Treatment of Depression

1. Mild depression can be helped symptomatically by drugs of the amphetamine group. Since most attacks of depression are self-limiting, amphetamines with barbiturates at night will, if the attack is short, give symptomatic relief for short periods until spontaneous recovery occurs. They should be used therefore when it is probable that the attack will end soon. Amphetamines produce tolerance, so that courses should not exceed three weeks.

2. Mild depression is much influenced by outside circumstances, so that help with pressing difficulties may cause improvement. Reactive and endogenous depression are, however, to be regarded as the same condition with different precipitating causes. Physical health influences mood, so that occupation and physical training can be expected to help to get normal regulation re-established.

3. Chronic and severe depression may sometimes reach a point at which it is not amenable to E.C.T. That it is not effective at one time does not mean that it will not work at another.

4. The indirect A-D drugs can be used successfully by reference to the explanatory diagram. This does not mean that the diagram portrays what is going on in the nervous system. It presents a caretaker hypothesis which can be used until more is known. It is in accord with the empirical facts of treatment.

5. Once the initial dose has caused normal mood to be regained (i.e. the reserve tank is now full of A-D substance), a maintenance dose must be found which will just keep it full. If this is not adequate it will produce no effect at all because it does not bring the reserve up to threshold level.

6. Side-effects of A-D drugs are immediate, while the therapeutic effect is much delayed. This is a state of affairs which the patient finds difficult to appreciate. *It is virtually impossible for a patient to regulate his own dosage in the early stages of treatment.* He becomes confused between the direct effects and those which come on later. This is especially so in those drugs (e.g. Cavodil) in which there is an immediate as well as a remote effect in mood.

7. It is quite impossible to regulate dosage if amphetamines are given at the same time. They are therefore contra-indicated for this reason alone. If both drugs are used, a proportion of patients develop severe headache.

8. Dosages of the A-D drugs are even more difficult to establish when complications, such as torsion-dystonia, cataplexy and paralytic ileus occur during the initial high-dosage period of treatment. They are, however, rare at the maintenance level of dosage.

9. There appears as yet to be no reason why, if necessary, these drugs should not be given at maintenance level for long periods. Unless the patient has had previous attacks or the family history shows a definite pattern of attack, it is quite impossible to tell how long the attack would have lasted if left untreated. Reduction of the dose with a view to continuing the drug can therefore only be by trial and error. Rapid reduction may precipitate severe depression.

10. Each drug has its own side-effects, complications and syndrome of over-dosage. It will sometimes be impossible to avoid over-dosage in the early stages. If signs of this appear, the drug must not be stopped altogether but reduced gradually if severe relapse is to be avoided. The effect of a change of dose will not be experienced at once, as is evident from the diagram.

1.—NARDIL (PHENELZINE) AS A POTENTIATOR OF ELECTROCONVULSIVE THERAPY (E.C.T.)

2.—A SURVEY OF OUT-PATIENT E.C.T.

By

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THE following are summaries of work carried out at Powick Hospital, Worcester, as a project approved by the Medical Research Committee of the Birmingham Regional Hospital Board, which also gave financial assistance.

1

It has been the experience so far that anti-depressant drugs do not replace E.C.T. (1) although their actions may be similar (2), but it is also necessary to determine if they potentiate E.C.T., either by reducing the number of treatments required, or bringing about a more complete recovery. Tofranil (imipramine) has been claimed as acting in this way (3) and Marsilid (iproniazide) has also been investigated (4). Sargant (5) believes that Nardil (phenelzine) is one of the better anti-depressants, and accordingly a controlled blind trial on 100 out-patients receiving E.C.T. twice weekly was arranged, using Nardil in a dose of 15 mg. t.d.s., alternatively to an identical placebo tablet. The only selection made was that the patients were receiving out-patient E.C.T. for the first time. They were all rated on a 25-point scale before, during, and after E.C.T., and the treatment was terminated by estimating clinical recovery. Rating values were restricted to 0, 1 and 2 only. Side-effects were experienced by two patients who felt faint (6).

CONCLUSIONS

(*a*) Nardil did not reduce the E.C.T. requirement significantly: average number of treatments while taking Nardil was 7, and while taking placebo 8.

(*b*) Nardil significantly potentiated E.C.T., as shown by the following figures:

Tablet	No. of Patients	Mean Rating	Standard Deviation	Value for Difference Between Means	Significance
Initial Ratings					
Nardil	55	12·05	3·45	t=1·6	Nil
Placebo ..	45	10·93	3·20		
Final Ratings					
Nardil	55	4·82	2·75	t=2·6	at 2% level
Placebo ..	45	6·62	4·04		
Differences (Initial and Final Ratings)					
Nardil	55	7·24	4·37	t=3·0	at 1% level
Placebo ..	45	4·31	5·28		

2

A survey of 128 out-patients receiving twice-weekly E.C.T. showed certain features of interest.

The sex ratio, female to male, was 2 : 1, and in the 40–50 age group was 3 : 1; this may correspond with the prevalence of menopausal depression. The commonest complaints among patients were symptoms of depression, which occurred in 93 per cent., anxiety in 93 per cent., and sleeplessness in 86 per cent., and these, together with restlessness in 71 per cent., formed the picture of the acutely, but not severely, depressed case. Seventy-five per cent. of patients recovered with treatment, 19 per cent. did not respond and E.C.T. was stopped (some of these were actually made worse), and lastly 6 per cent. were admitted, either due to failure of treatment or to adverse home circumstances.

Patients could be divided into 3 "symptom-clusters":

(1) Depressed .. .. a total of 50 per cent.
(2) Suicidal .. .. a total of 34 per cent.
(3) Multifactorial .. .. a total of 16 per cent.

In further detail, the first group were basically depressed, and in 85 per cent. this state had progressed so far that prepsychotic symptoms were apparent, e.g. withdrawal, retardation, flattening of affect and inability to concentrate. Judging by the preponderance of these patients, it may be that the majority of depressions without prepsychotic components respond adequately to anti-depressants and are thus not referred for E.C.T.

Group 2 described suicidal thoughts as well as depression, had a female to male sex ratio of greater than 3 : 1, and were markedly tense. As soon as tension was relieved, which it was in all after 4 treatments, the suicidal component disappeared.

The multifactorial group represented a heterogeneous collection which might yield symptom-clusters in a larger series. These patients had psychotic symptoms such as paranoid delusions, hallucinations, thought-blocking, mood elevation and egocentricity. Recovery was not nearly so complete, they required more than the average number of treatments and these results agree with those of Ackner and Grant (7).

The average reduction in rating value at the end of treatment in (1) was by half, in (2) by three-quarters, and in (3) by one-third, therefore the multi-factorial group had the worst prognosis, and the best was afforded by the depressed patient who had suicidal ideas.

It was found that patients with inadequate, immature and hysterical features responded poorly to E.C.T.

There were no complications of the E.C.T. itself, with a total of 1,100 treatments using a standard technique with pentothal, suxamethonium chloride and atropine.

ACKNOWLEDGMENTS

Dr. K. W. Cross of the Birmingham Regional Hospital Board gave valuable advice on the statistical design of this project and carried out the analysis of the results; to him I am most grateful.

The Medical Research Committee of the Birmingham Regional Hospital Board are thanked for their approval and financial assistance generously given.

Messrs. William R. Warner and Co. kindly supplied the Nardil and placebo tablets, and their Medical Director, Dr. D. D. H. Craig, gave much valuable help.

I am also grateful to the consultants who allowed me access to their patients, and to Miss Preece whose E.C.T. Unit functioned so well during this investigation.

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ADJUNCTIVE THERAPY IN DEPRESSION: A CONTROLLED TRIAL OF NIALAMIDE

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THE efficacy of anti-depressant drugs, including imipramine and the so-called monoaminase inhibitors, and their potential as a replacement for E.C.T. remain undefined. Imipramine, which has been most extensively studied, has been shown to produce an initially lower improvement rate than E.C.T. in depressives, though after six months the results are little different (Kiloh and Ball, 1961). Dewhurst and Pare (1961) have reported that the quality of improvement in the cases who improved with nialamide in their partially blind trial was comparable to that seen with electroplexy. There is still a lack of controlled trials on the monoaminase inhibitors, particularly as regards patients sufficiently disturbed to warrant hospitalization. Harris and Robin (1960) found no evidence that phenelzine influenced recovery in these patients.

METHOD

In our trial of the effect of nialamide (a hydrazine in the amine oxidase inhibitor group) on 50 severely depressed hospitalized patients, we compared this drug with chlorpromazine by a double-blind arrangement. It seemed unethical to use an inert substance and chlorpromazine has been advocated as a treatment for depression (Diethelm, 1958), though it is not so used here. Our patients received either 50 mg. of chlorpromazine or 50 mg. of nialamide t.i.d. in random sequence. The tablets were identical and specially prepared by Harvey Pharmaceuticals, who manufacture nialamide as "Niamid".

The patients were selected from 68 consecutive admissions for depression, from which 18 were excluded because of doubts regarding diagnosis, the need for immediate E.C.T., difficulty in co-operation or administrative reasons. They were rated on a five-point scale based on a structured interview from which a symptom scattergram was prepared. They were re-assessed after two weeks, and if improvement was significant we put them on a known nialamide 50 mg. tablet t.i.d., and interviewed them again at four weeks. Those who did not improve received other appropriate treatment.

RESULTS

The group showed the following characteristics: There were 33 women and 17 men. The age groups were: under 46 years, 8; 46–65 years, 26; 66 years and over, 16. Nineteen patients had shown obvious personality deviation before illness and 35 had had mental illness previously. Twenty-two had an associated physical illness and 12 showed hysterical overlay. Twenty-nine were suicidal. In 27 cases environmental stress was a precipitant and in 15 loneliness was an environmental factor. A table of catamnestic data was available to differentiate the chlorpromazine groups from those receiving the nialamide. From this we note that of 26 who received nialamide, 20 were women, 14 had physical

illnesses, 7 had raised blood pressure and 3 hysterical overlay. In the chlorpromazine group of 24, 11 were men, 8 had organic illness, 2 raised blood pressure and 9 hysterical overlay. Sixteen in this group had paid employment compared with 8 in the other group—this is probably linked with the sex difference.

The 14-day improvement rate was 76·9 per cent. for the patients on nialamide, as compared with 66·6 per cent. for the chlorpromazine group. Following the course of the illnesses further, however, 13 patients required other specific anti-depressant treatment (electroplexy, imipramine, etc.), and the final recovery rates were 50 per cent. with nialamide (13 patients) and 42 per cent. with chlorpromazine (10 patients), when the trial was completed.

Examination of the original ratings shows that 13 of the patients who recovered on the drugs were classed as very severely depressed (nialamide 8; chlorpromazine 5). Of those who failed to improve on nialamide or required electroplexy later, 4 were markedly retarded.

The assessment of personality deviation presents difficulties, especially in patients who have had several attacks of depression when the original patterns of behaviour become obscured by the effects of illness and hospitalization. Nineteen patients showed general inadequacy, hypersensitivity or lack of confidence throughout life or sociopathic traits. Nine were in the nialamide group. Their response to drugs did not differ from the "normals". Side-effects: increase in anxiety occurred in 4 nialamide cases and in 2 on chlorpromazine; whereas 12 nialamide and 7 chlorpromazine cases experienced reduction of anxiety. One skin rash occurred in a chlorpromazine case. There were no other side-effects.

Discussion

It has been observed frequently that whereas uncontrolled trials show a high percentage of success with new drugs, controlled experiments considerably dampen enthusiasm. The difficulty in defining the type of case dealt with in psychiatric research of this kind is considerable. The overlap of both symptomatology and aetiological factors in so-called endogenous and reactive depressions is well recognized, and often becomes greater as patients are investigated more intensively. We rated our patients on severity of illness and observed the incidence of 16 symptoms and signs during the assessment. Though the patients' progress was reasonably satisfactory, we feel that further follow-up enquiries are required.

Depressive illness is frequently remittent in the wake of changes in circumstances and drugs, or even spontaneously, and it could be anticipated that some improvement would follow hospitalization alone in a series such as this where so many illnesses were precipitated by environmental stress and complicated by loneliness and personality difficulty. According to our normal hospital practice, the patients were investigated to provide an analysis of the situation and the factors predisposing to and precipitating the illness, and exploratory and supportive psychotherapy was available to the patient to the extent to which it could be accepted and utilized. Such factors in the background can be conveniently forgotten if one seeks to make a case for the efficacy of new drugs.

It may also be relevant to note the observations of Karagulla (1950), who reviewed 1,611 admissions for depression in 923 patients admitted to the Royal Edinburgh Hospital between 1930 and 1948. Having traced the patients' histories back as far as 1930 in some cases, she stated that "an unexpected finding was the relatively large number of patients with an illness of short

duration necessitating only six weeks' stay in hospital". Of these patients only 318 had electroplexy, and amphetamine was the only anti-depressant available.

Summary

1. A controlled trial of nialamide compared with chlorpromazine is reported in 50 hospitalized depressive patients.

2. At two weeks the improvement rate was 76·9 per cent. for nialamide and 66·6 per cent. for chlorpromazine. The final improvement rates (i.e. at the completion of the trial) were 50 per cent. for nialamide and 42 per cent. for chlorpromazine. Neither the short-term nor the longer-term difference between treatment groups was statistically significant.

3. These results are discussed in relation to spontaneous recovery and the therapeutic effect of hospitalization.

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COMPARISON OF TWO ANTI-DEPRESSANT DRUGS (IMIPRAMINE AND PHENIPRAZINE) IN ENDOGENOUS DEPRESSIVE ILLNESSES IN FEMALE IN-PATIENTS

By

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The following study was designed to compare the effectiveness of imipramine (Tofranil) and pheniprazine (Cavodil) in the treatment of endogenous depression. Controlled trials have shown the value of imipramine (Holdway, 1960) and therefore no placebo group was included. The theoretical advantages of a cross-over technique were considered to be outweighed by such disadvantages as the tendency for the effects of the first therapeutic agent to continue into the second phase of the experiment; and the tendency for rapid remissions to occur with anti-depressive drugs and to persist for a period despite withdrawal. Thus two similar groups of patients, each treated with full dosage of their respective drugs, were compared. The selection of patients was randomized, and the trial was blind throughout.

Before the trial was commenced a simple method of scoring was evolved on a three-point scale in respect of ten criteria of assessment, viz. depression, retardation, agitation, suicide, insomnia, delusions, hypochondriasis, depersonalization, anorexia and constipation. Each was awarded either 0 (absent), 1 (mild) or 2 (severe) according to a detailed schedule.

Using this system each patient was interviewed by the author initially and at weekly intervals for four weeks. The maximum possible improvement on the scale was from 20 points to nil.

Follow-up studies were not possible, as the patients were admitted from an extensive catchment area, and on discharge were referred back to out-patient clinics under other psychiatrists.

All patients who on admission to an acute female admission unit were diagnosed as suffering from endogenous depression were automatically included in the trial. A prescription for "Anti-depressive Clinical Trial" was given to the Chief Pharmacist who, by using Bradford Hill's random sampling numbers, divided the treatments between a fixed dosage routine of either imipramine or pheniprazine (Table I).

Table I

Dosage of Anti-depressive Therapy

Imipramine, 25 mg. tablet	75 mg. daily for first 3 days 150 mg. daily subsequent 3 days 225 mg. daily subsequent 8 days 150 mg. daily remaining 14 days
Pheniprazine, 3 mg. tablet	24 mg. daily for 14 days 12 mg. daily subsequent 14 days

All patients had routine weekly interviews; formal psychotherapy was not employed. The patients did not attend occupational therapy classes, but they

were all encouraged to help in the ward routine and to occupy themselves with sewing, knitting and handicrafts in the ward.

In order to avoid difficulty with the interpretation of the results, any cases where the giving of electroplexy as a "life-saving" measure was necessary were excluded from the analysis of the results.

Results

During a one-year period 49 patients qualified to be assessed in this comparative study involving a total of 59 patients in all. Of the ten cases excluded, four had commenced imipramine and six had commenced pheniprazine.

The ages of the patients ranged from 38 to 75 (mean 56·5) and in the two groups the numbers were:

	Patients	Age Range	Mean
Imipramine	26	38–71	55·7
Pheniprazine	23	40–75	57·4

The two treatments were compared directly by preparing a table in which the total numbers of patients in each grade of severity of every symptom were represented. Table II shows the results in the assessment of the symptom "depression".

Table II

Symptom—"Depression"

Total Number of Patients in Each Category

	Initial			7 Days			14 Days			21 Days			28 Days		
Scoring	2	1	0	2	1	0	2	1	0	2	1	0	2	1	0
T	24	2	0	12	14	0	4	15	7	0	15	11	0	12	14
C	19	4	0	10	13	0	3	19	1	2	16	5	0	10	13

T=Imipramine C=Pheniprazine

By inspecting the table for other symptoms it was clear that the most divergent portion of the table lay under "depression" after 21 days. By comparing the number of patients with depression and without depression, in relation to the two drugs, the significance of the difference between these two groups was determined.

Table III

	Depression Present	Depression Absent	
Imipramine	15	11	26
Pheniprazine	18	5	23
	33	16	49

χ^2 (with Yates correction)=1·506. This difference is not significant at P=0·05 level, and thus, under the conditions described, neither treatment is superior to the other.

Although there have been many publications devoted to the unwanted effects of both imipramine and pheniprazine, no complaints were received from the patients unpleasant enough to necessitate withdrawal of the drug. In one patient treated with imipramine a mild hypomanic reaction occurred.

No attempt was made to assess liver toxicity as a routine, as it was felt that sufficient evidence had accumulated from other studies (Crisp *et al.*, 1961) to suggest that pheniprazine was relatively safe to use without controls of this sort. With imipramine the normal clinical observation in the ward was felt to be sufficient routine security against the appearance of toxicity.

Conclusion

In a blind and fully randomized study comparing results of treatment of female patients diagnosed as suffering from endogenous depression who were admitted to Whittingham Hospital, Preston, it has been established that no significant difference exists between imipramine and pheniprazine on fixed schedule treatments over a four-week period, both treatments being equally effective for the ten variables under consideration.

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THE TEACHING OF PSYCHOLOGY IN THE MEDICAL CURRICULUM*

By

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Introduction

It may be recalled that the Recommendations adopted by the General Medical Council in 1957 refrained from specifying the period of time to be allotted to particular subjects, or the sequence in which they should be taught. They considered the primary task to be that of finding means to reduce the congestion in the curriculum: to instruct less and to educate more: and they trusted that the licensing bodies and schools would not feel limited in their right, even their duty, to experiment with different courses and various methods of teaching.

At Liverpool, for several years much thought had been given to revision of the curriculum and to the possible ways in which it could be improved. One suggestion was to shorten the pre-clinical course proper and to continue the teaching of Anatomy and Physiology into the clinical years; but it was finally decided to lengthen the total pre-clinical course by one term and to include in the course as a whole an introduction to clinical subjects. By the addition of this one term to the total period devoted to the clinical sciences it was sought to reduce the current congestion. The first of the two years so set aside was to be devoted to Anatomy, Organic Chemistry, Histology, Medical Genetics and kindred subjects, the second to Physiology, Biochemistry, Psychology, Pathology and, during the third term of that session, to Pharmacology. Of this second year programme the portion allotted to Psychology is substantial, amounting to some 80 or 90 hours. In terms of time-table, this means that Monday afternoons from 2 to 5 throughout the Session have been allocated to psychology. We are at liberty to hold such terminal examinations, or other tests, as we consider necessary, and with regard to the professional examination, it is provided that psychology shall contribute a compulsory part of one written paper, and shall also be represented in the oral examination.

The members of the staffs of the Departments of both Psychology and Psychological Medicine have given close attention as to how the challenge so afforded could best be taken up.

The pre-clinical importance of the topic resides not only in the advantage of introducing psychology as a basic subject at a juncture when medicine might appear to be a strictly physical, visual and wholly objective study—an affair of mechanisms, dissecting and post-mortem rooms, microscopes, diseased tissues and micro-organisms—but also in the fact that the pre-clinical period comes at a critical phase in the student's own personality development: and it is sub-

* A condensation of papers contributed to a Symposium at a Meeting of the Northern and Midland Division of the R.M.P.A. held in Liverpool on 15th April, 1961.

mitted that access to him during this period could have more far-reaching and widespread results in medicine than, say, the intensive training of a necessarily smaller number of family doctors, desirable though this, too, may be.

The aims of such a course are conceived as being, and in the order given, first, to rivet the student's attention—without the achievement of this difficult step all will be lost—and, having done so, to stimulate his interest. Thirdly, it is essential to support the student psychologically during what will be, and what can only be described as, his learning experience. A fourth requisite, of course, is to impart some knowledge.

As things stand at present it is probable that the practice of psychological medicine, not to say personal medicine, is about as unlike any preconceived idea of it that the student may have had as it could possibly be. Despite the valuable and helpful report by the students' own organization, the British Medical Students' Association, on the Teaching of Psychiatry and Psychological Medicine in British Medical Schools, it is on the whole unlikely that the student contemplating a career in medicine will have included psychology in his reflections.

Apart from that rather negative disadvantage, it is probable also that he will be positively intolerant of any matter which does not appear directly related to his concept of doctoring—initially, perhaps, a mildly dramatized power phantasy in which he figures in at least a diagnostic, if not a curative role. The teacher may expect, too, intolerance of anything a little "dry", "abstract" or "academic", using those terms in their derogatory sense. Actual conscious resistance may be attributable to preconceived ideas, in turn based on scraps of information the student may have gleaned concerning psychology of a popular kind, while *un*conscious resistance may be due to personal factors peculiar to the individual. There is, for example, the student who, although the word psychology appears on the question paper, persistently mis-spells it throughout his answer; or the one who is prepared to sacrifice all the marks he might have gained for the satisfaction of dismissing the whole examination in one contemptuous sentence.

In his paper read to the Section of Psychiatry at the Joint Annual Meeting of the British Medical Association and Canadian Medical Association at Edinburgh in 1959, Professor Denis Hill suggested that the basic reasons for these subjective attitudes on the part of the medical student lie deeper. Briefly, he shows how, great though its successes, aetiological medicine, based on the explanatory hypothesis of biology, has failed to cover all the facts of human behaviour, in particular those of psychological illness. He indicates how the subject must be viewed not only from the standpoint of physical determinism but, also, from that of teleology. He expressed the opinion that, until the limitations of the explanatory hypotheses of a medicine based on causal-mechanistic concepts is more generally recognized, little change of attitude can be expected, and he makes no secret of the difficulties that confront us.

In the light of these considerations, and bearing, in particular, the resistance factor in mind, it is suggested that the teaching approach in the pre-clinical period might be linked with:

1. Physiology, and even anatomy, of a functional and biological kind, of the central and peripheral nervous systems—this for the purpose of disarming a natural suspicion in the student's mind.

2. Psychology—general and clinical.

3. Personal medicine, i.e. a clinical psychology which does not at this stage

include study of mental abnormality, but which appertains to people regarded as normal, and to patients in general, in their social setting.

4. Personal contact with, and support from, a tutor.

General Considerations

Psychologists themselves, not surprisingly, are interested in the psychology taught to medical students and are concerned that as far as possible it should be sound and up to date. In a subject that is growing and changing at an increasing rate the dangers of teaching outmoded material is considerable, especially if, as is often the case, instruction in psychology is in the hands of those who are not themselves primarily psychologists. It was with this point of view in mind that the training committee of the British Psychological Society undertook an enquiry into the teaching of psychology to medical students (Hearnshaw, 1959).

Reports on medical education during the past twenty years have revealed a growing weight of opinion in favour of teaching psychology or more psychology to medical students.

The 1957 recommendations of the General Medical Council include a note to the effect that "instruction should be given in the elements of normal psychology" in conjunction with instruction in anatomy, physiology, and biochemistry.

In theory we may well say the battle for psychology has been won. What in actual fact is the state of affairs in our medical schools? It was this question which the British Psychological Enquiry undertaken nearly four years ago was designed to answer. Some changes have, of course, taken place since then; still larger changes are proposed in several medical schools. But it still remains true that a good many medical students know remarkably little psychology at the end of their medical course—this is obvious from the very elementary level at which it is necessary to pitch the psychological instruction of Part I D.P.M. students. It has even been suggested recently that a side-effect of medical education is "to leave the doctor with less intuitive understanding of his fellow men than is possessed by unschooled people" (Bourne, 1959).

The B.P.S. enquiry carried out in November, 1957, revealed that short courses of instruction varying from four to twenty lectures on normal psychology were given in most medical schools concerned with pre-clinical instruction. Sometimes these lectures were voluntary and poorly attended. In the majority of schools (16 out of 22) no examination questions were set. In seven schools instruction in psychology was regarded as valuable and as interesting to the students, in the remaining schools more or less serious doubts of its value were expressed, and frequent changes in syllabus and method of approach reflected a dissatisfaction with the instruction given.

So in spite of the authoritative pronouncements that psychology ought to be taught to medical students, we find in practice that it is more often than not taught only on a small scale, half-heartedly and with somewhat doubtful success. In the light of these facts it seemed to the B.P.S. committee that it might be desirable to press for minimum standards in the teaching of psychology (as is the case with the recognized basic subjects in the curriculum); and for the inclusion of psychology in the examinations. If psychology is sufficiently important to have a place in the curriculum, it is illogical to exclude it from the examinations.

The ground covered in courses on normal psychology is very diverse. The topics most frequently included are motivation, psychological development and intelligence. The limited time available for psychology necessitates selection, and there appears to be considerable disagreement as to how this selection should be made. The main difficulty is in striking the right balance between the academically acceptable and the practically relevant. A great deal of the material contained in textbooks of experimental psychology is too limited and too divorced from medicine to be interesting to medical students. Much psychology is too doctrinaire and speculative to be acceptable. It is important for medical students—and psychiatrists—to recognize that psychology does not identify itself with any extremist schools.

An opposite danger is to debase psychology to the level of popular practical psychology; to say that the accent should be on the fact that patients are human and to aim at improving the doctor-patient relation. This is what some students want, and what some people think they ought to have. An Otago student, quoted by Bourne (1959) asserted "The psychology course should be aimed at improving the doctor-patient relationship more than at burdening the students with details. The best examples of practical psychology that I can think of are, Norman Peale's *Power of Positive Thinking* and Dale Carnegie's *How to Win Friends and Influence People*". Now, no doubt, these matters are important: but it is not the place of the psychology course to impart them. They are, in fact, best handed on by tradition and example and become tedious when set out as principles, instead of being imparted for what they are—namely empirically derived "rules of thumb".

As to the content of psychology courses much can be learned from Dr. Bourne's Otago experiment (1959). Dr. Bourne states "I tried to present psychology as a science with the same order of complexity, diversity, discipline, and biological rectitude as other sciences familiar to the student. The lectures were, therefore, deliberately arranged to cover circumscribed patches of ground at an advanced level, and to need concentration no less strenuous than other medical subjects."

It seems that Dr. Bourne's approach was the right one; that to deal with "circumscribed patches of ground at an advanced level", or at any rate at a fairly advanced level, is the most likely to command respect, and to accord with the tradition of a University, where instruction should be based on principles of some generality. It is academically sounder, for instance, to give instruction in the general principles and problems of communication, than to talk about the doctor-patient relationship as such. It is the principles that matter; and if the student has grasped these, as far as they are known, he should be able to apply them to the concrete situations he will meet in practice. Again it is not bits of good advice on handling children that are needed, but a grasp of the processes involved in child development—on the cognitive side, for example, as illuminated by Piaget's researches. By all means let there be illustrations from medical practice, but let not the illustrations supplant the basic principles, in so far as these have been uncovered by psychological research.

Immensely valuable would be a sound and stimulating textbook of general normal psychology specially written for medical students. This need was pointed out by the Cohen Committee, and it still remains a need. Because of difference in culture-pattern between this country and America, a textbook preparation in this country would have advantages over an American text. It should obviously be written by a psychologist with wide clinical experience, whether or not he is medically qualified. In addition the preparation of a selected, graded,

and annotated guide to reading in psychology for medical students is most desirable.

All the points made in the preceding section have really been derived from one guiding idea: if psychology is to be taught to medical students, and there seems now to be widespread agreement that it should be taught, it ought to be taught seriously and soundly. There should be minimum standards of instruction; the subject should be examined, it should not be a brief and isolated, but a continuing feature of the curriculum, organically linked to the other main parts; the topics treated should be treated with some generality and at a fairly high level; and the instruction should be given by a team of well-qualified persons and backed up with a good text and other supplementary reading.

The Essential Place of Psychology in the Curriculum

A number of reasons have been advanced for including psychology in the medical curriculum, which may be fairly summarized by quoting the three given in Section 143 of the Cohen Report (1948):

> "First, it is to convince the student of the essential place of mental processes in his general study of the normal structure and function of the human being."

> "Secondly, to equip him with standards of reference against which he may assess the deviations from normal which he will find in his clinical studies and practice, and thirdly, to provide him with a basis for the rational appreciation of the doctor-patient relationship."

In other words, normal psychology is to be studied because of its relevance to:

(*i*) The physically and mentally healthy person.

(*ii*) The mentally ill patient.

(*iii*) The doctor himself and his relationship to his patients.

There seems to be one area to which the relevance of normal psychology has not received sufficient emphasis, namely the normal psychology of physically ill people. This omission may be significant, and may reflect the tendency to suppose that physical illness presents no psychological problems; or if it does, that such problems have no relevance to the course and treatment of the illness, and therefore can be safely ignored. In fact, it is in just this area that the study and application of normal psychology has particular relevance.

The student may be prepared to accept in theory that he ought to understand the "whole man": normal mind and normal body and their interrelatedness. He will accept that a proper understanding of psychiatry will necessitate his knowing a little normal psychology. He will be familiar with the oft-quoted statistic that 30 per cent. of the patients in a doctor's surgery have symptoms with a psychological origin, and that nearly one-half of the hospital beds in the country are psychiatric. But what may not have occurred to the student, and what must be made abundantly clear, is that *every* physically ill patient however mentally "normal" or "stable", will have reacted psychologically to his physical symptoms and to the effects of his illness on his dependants, his work and his future prospects. This reaction moreover may have had some effect on his own physical condition and therefore on the course of his illness. When it is said that the patient will have "reacted psychologically",

it is not implied that he will have produced acute psychiatric symptoms of a neurotic kind. What is referred to are the natural reactions of ordinary people when they are ill. These will, of course, be mild forms of symptoms which, if they were more acute, would be called "psychiatric", but which are not the kind which would normally excite much attention on the part of the physician, surgeon or general practitioner. If *acute* symptoms of this kind develop, the psychiatrist is readily called in by his colleagues; but in the mild forms exhibited by the majority of patients, any suggestion of the need for psychiatric help might well be resented by the patient and resisted by his doctor. Thus it would be important to emphasize the *normal* nature of those psychological reactions present in the majority of patients with common physical illnesses, whether seen in the hospital ward, out-patient clinic or doctor's surgery. Although it is often as important to deal with these psychological reactions as it is to treat the illness itself, this aspect of the problem is too often ignored. It is suggested that it is in this field that the medical student is most likely to be convinced of the relevance of the study of normal psychology, the more so since the great majority of patients he will meet in the early years of his training will be physically ill patients.

The work of Spitz and others (1960) in the field of children's reactions to hospitalization could well serve as a starting point, followed by an outline of the main types of personal and social difficulties encountered by adults having to go to hospital and facing illness, pain and possible permanent impairment of function. There would be an opportunity here to describe simple and effective measures which could be taken to allay the patient's anxiety. These would include reassurance; the communication of correct information to the patient in simple language and at the right time; and a simple explanation in advance of the nature of, and the reasons for, surgical operations, physical investigations and medication. It could be emphasized that to leave the patient guessing and speculating about himself is the surest way to make him anxious. These points would need to be fully illustrated by case histories of patients with common physical illnesses whose psychological reactions have been studied. This, in itself, is a new field, and might require a special research to obtain the necessary case material. Tape-recordings of interviews with patients would be helpful. The general theory of psychodynamics, reaction to stress and frustration, and the operation of the so-called "mental mechanisms" could be described. Some account could well be given at this stage, of the group structure of the hospital ward, with special reference to role playing, and the particular relationships which develop between the patient on the one hand, and the doctors and nurses on the other.

An account of the psychosomatic illnesses such as asthma, skin lesions and peptic ulcer would form a natural bridge between physical illness and mental disorder. It could be pointed out that just as physical illnesses have their psychological sequelae, so mental disorders are associated with physical malfunction. One thinks of the retardation in depression which involves not only the psychological activity of the patient, but also his alimentary, circulatory and autonomic functions. It does not seem that this is the right part of the course to include any detailed study of mental disorder. It might be as well to emphasize the concept that mental abnormalities are deviations from the normal rather than disease entities to be recognized and given diagnostic labels. The statistical rather than the dichotomous concept of normality might be the more appropriate. Disturbances of consciousness, abnormal perception, imagery and thinking could be described in an elementary way, and compared with normal

functioning. Unusual patterns of affect and conation could be linked with behaviour and personality deviations.

In the study of the psychology of the physically healthy person, the obvious starting point would be a discussion of the physiology of emotion, the physical basis of consciousness, perception, thinking, memory and speech, and the inter-relation of physique and temperament. The more purely psychological part of the Course could well be introduced by a general lecture on the aims and methods of scientific psychology. The main facts of cognitive and orectic psychology could then be dealt with, including such topics as perception, imagery, thinking, memory, feeling, emotion and conation. A study of motivation would lead to a brief outline of some of the theories of personality and methods of its assessment. It would probably be advisable to include some account of development in childhood, the changes at adolescence, and the various adjustments that take place with advancing age.

Finally the relevance of normal psychology to the doctor and his work, and indeed to the student himself, could be discussed. An understanding of the subjective factors in perception is an essential prerequisite to accurate observation, clear thinking and correct judgment. A fairly detailed study of the psychology of the interview, and of the factors leading to good rapport between a doctor and his patient, has clear relevance to the student's later work; and this could be extended to include an account of the doctor's role in society and the doctor-patient relationship. An account of the recent work on "placebo response" (*Brit. med. J.*, 1961) could well be included and it would be important to deal carefully with the psychology of study and the passing of examinations.

As Professor Hearnshaw has pointed out, "The medical profession clearly prefers that instruction even in normal psychology should be given by medical psychologists", because "courses run in this way seem to meet with fewer difficulties". He says, quite rightly, that "non-medical psychologists have not always been successful in adapting their teaching to the needs and outlook of medical students". He comes to the conclusion that "the best arrangement is likely to be a very close collaboration between medical and non-medical psychologists". This "very close collaboration" should, it is felt, imply that both medical and non-medical psychologists would share in the lecturing. This is important, for something of value might be lost by excluding the non-medical psychologist from direct contact with medical students, since his training and point of view is rather different to that of the medical psychologist. The psychiatrist is trained in the clinical manner, and is therefore inclined to see patients as exemplifying this or that disease entity. He is interested in the eliciting of symptoms from which he can diagnose an illness and so decide on treatment. The psychologist is trained in a somewhat different manner, and tends to see patients as people whose symptoms are deviations from a norm. He is interested in the personality as a whole: in the normal as well as the abnormal features. The psychologist asks, "What sort of man is he?", the psychiatrist asks, "What's wrong with him?" The psychologist employs a statistical norm, the psychiatrist an ideal or dichotomous one. These differences in training and approach suggest that the psychologist has a point of view to express which might be of value in the teaching of medical students whose pre-clinical training in the exact sciences has tended to follow the nomothetic approach, and whose clinical training is not yet sufficiently far advanced entirely to replace it by the idiographic. There are, of course, many topics which have been mentioned in this account of a possible syllabus, which could only be dealt with by medically qualified lecturers. There are others, however, which might be better

covered by a professional psychologist who has managed to keep abreast with recent developments, and the latest fashions in psychological thinking. There are some areas, too, which might well be covered in lectures given by a clinical psychologist sufficiently experienced in psychological reactions to physical illness.

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CONTRASTING SUICIDE RATES IN INDUSTRIAL COMMUNITIES

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DIFFERENCES between the suicide rates in various parts of the same country or in different parts of an urban area have frequently been investigated. Correlations between the incidence of suicides in different districts of large cities and their socio-economic characteristics have been established (Cavan, 1928; Sainsbury, 1955). Suicide rates of contrasting communities, urban and rural, have been compared (Carstairs and Brown, 1958).

Differences in the suicide rates of various cities of the same country have received little attention. It has repeatedly been observed that there is a positive correlation between the size of an urban population and its suicide rate (Durckheim, 1952; Waldstein, 1934; Gruhle, 1940). Exceptions to this rule have sometimes been reported, most recently by Capstick (1960) in a study of suicide in Wales. These exceptions are worthy of study because they are likely to be due to special factors which it may sometimes be possible to isolate.

The suicide rates of some industrial communities in the North of England have been found to show striking differences which are at variance with expectations. Although it is hardly ever possible to study all the numerous factors influencing the suicide rates, an attempt has nevertheless been made to explore these discrepancies.

In the North of England, two urban communities stood out as unusual with regard to their suicide rates. Sheffield, an industrial city of half a million inhabitants, had a surprisingly low suicide rate. Burnley, on the other hand, has had a very high suicide rate, although its population is only about one-sixth of that of Sheffield and would therefore be expected to have a lower suicide rate than Sheffield. The Sheffield rate was below, the Burnley rate far above the national average. Leeds has been included in this study. Its population is of approximately the same size as that of Sheffield, but its suicide rate has not been exceptionally low.

Table I shows the mortality rates from suicide calculated per 100,000 of the estimated populations of Sheffield, Leeds and Burnley for the five years 1952 to 1956. The major part of the data for this investigation was collected during 1957 and 1958. The figures were based on the reports of the Medical Officers of Health.

TABLE I

Suicide Mortality Rates per 100,000 of the Population

	Sheffield	Leeds	Burnley
1952	8·0	11·7	19·1
1953	9·3	11·9	27·6
1954	5·6	13·2	30·1
1955	9·0	12·4	26·5
1956	10·0	11·0	42·5

Enquiries into the suicide rates of other comparable communities in the Midlands and the North of England were made, but they could not be included in this study. The towns were Nottingham, Rotherham, Doncaster and Blackburn. The suicide rates in these communities were higher than in Sheffield and Leeds. In the first three they exceeded the national average, which was to be expected for industrial communities. The Blackburn figures for 1953, 1954 and 1955 were as excessive as those of Burnley. This appears to be in keeping with the fact that Blackburn has more in common with Burnley than with any other of the towns mentioned above. It is only slightly bigger than Burnley and the two towns are known to share many social problems, especially those arising from the decline of the cotton industry.

The reliability of suicide figures has often been questioned. They no doubt have considerable fallacies and are probably underestimates. They do not include suicides masked as accidents and deaths indirectly due to suicidal injury. However, those fallacies are likely to be fairly constant and do not deprive fluctuations in the suicide rates of their significance, especially in large populations. In this country, variations in the practice of individual coroners have sometimes been suspected to be largely responsible for differences in the suicide rates of different communities. However, this source of error can be overestimated. Coroners, like other judiciaries, tend to follow precedent in deciding, in case of doubt, whether death was due to suicide or accident, or whether an open verdict is appropriate. But even if coroners should differ in their practice, it is doubtful whether this would grossly affect the suicide rates, because the latter are based on the figures reported by the Medical Officers of Health. A proportion of cases in which the coroner gave an open verdict are allocated by them to the category of suicide. This discrepancy is not surprising. Judicial verdicts have to be based on criteria different from those of a post-mortem diagnosis. While the coroner must refrain from judgment when the evidence of suicide is not beyond doubt, clinical and pathological diagnosis requires no more than a high degree of probability. The legal implications of a suicide verdict may also contribute to the coroner's reluctance to giving such a verdict. Possibly, open verdicts will be given less frequently now that suicide is no longer a criminal offence.

This study is based largely on evidence collected from various official records, including those of coroners' inquests. We are indebted to the Medical Officers of Health for valuable information concerning the characteristics of the populations under review.

A large number of social factors are known to influence the suicide rates. They are related to social conditions and to the composition of the population by age, sex and social class. The hypothesis to be tested is that Sheffield and Burnley differed, in the period under review, with regard to those factors in such a way that they made for a high suicide rate at Burnley and for a low suicide rate at Sheffield. Leeds could be expected to hold the balance between the two extremes.

The Composition of the Populations

Burnley used to be one of the cotton towns. The predominant feature of its industry was that both husband and wife went to work. The cotton industry has during the last three decades gone through a series of crises, the latest one beginning in 1952 and reaching its climax in 1955. As the mills closed, many of the women stayed at home and did not register as unemployed, while many of the men had reached retiring age. Therefore, the number of persons registered as

unemployed, who during the period 1952–56 averaged 609 for both sexes, did not show the true picture of unemployment. During and since the last war, the whole pattern of industry in Burnley has changed. In 1959, weaving constituted only about 12 per cent. of all types of industry. Recently there has been a shift to light industry which, it is hoped, is going to stop the drift of young people from the town.

The population of Burnley has shown a steady decline over the last three decades. In this respect it differed conspicuously from most other industrial communities in the United Kingdom. The process of decline had already started during the decade 1921–1931 when the town's population fell by 5,000. Between 1931–1951 it decreased from 98,258 to 84,950. In recent years the decline has been slowed down and has been in the region of 500 to 600 per year. In a survey of migration of industrial workers in the *Bulletin for Industry* (1959), the textile industry was shown to be responsible for by far the highest proportion of loss of employment and consequent loss of working population in the regions involved. According to the Census 1951, Burnley had shown the highest decrease among county boroughs, except for Salford, Oldham and West Ham, where the decrease was largely due to boundary changes and population movement within the same conurbation.

The Census 1951 shows that the number of persons aged 60 years and over was relatively greater in Burnley than in Leeds and Sheffield (Table II). According to the Medical Officer of Health of Burnley the loss of population has been entirely due to the migration of the young, and the present population has an excessively large proportion of the old age groups.

TABLE II

Percentage of Persons Aged 60 Years and Over
Census 1951

	Persons	Male	Female
Burnley	18·2	21·6	20·0
Leeds	15·6	12·1	13·4
Sheffield	15·2	13·4	16·7

Burnley's high annual death rate, compared with the death rates of Leeds and Sheffield (Table III) also reflects the relatively higher proportion of aged people among its population.

TABLE III

Average Annual Death Rates per Million for Burnley, Leeds and Sheffield for the Years 1950 to 1953

(Registrar-General's Decennial Report of 1958)

	Male	Female
Burnley	16,405	14,087
Leeds	13,628	11,487
Sheffield	13,312	10,670

Leeds and Sheffield have, in contrast to Burnley, been prosperous during the last two decades. The population of Leeds has grown steadily and was 505,219 in 1951. The fall in the population of Sheffield from 504,464 in 1931 to 489,701 in 1951 is only apparent. It is due to overspill into adjacent areas, where the City has built many housing estates. There was no evidence of massive emigration from either Leeds or Sheffield.

Indices of Social Disorganization. Some of these indices, i.e. the illegitimacy rates and the proportion of widowed and divorced people, could be ascertained for the three cities. They were lowest in Sheffield. In 1957 the illegitimacy rate for Sheffield was 3·8 per cent., compared with 5·8 per cent. for Burnley, 6·4 for Leeds and 8·9 for Greater London.

The percentage of widowed and divorced people together was slightly lower in Sheffield (7·5) than in Leeds (7·9) and considerably lower than in Burnley (9·1). Among the Lancashire boroughs, Burnley had the highest percentage of widowed and divorced persons, apart from Blackpool (10·8) and Southport (10·9) which occupy a special position, being resorts with a large population of retired people.

Social Class is another factor to be considered here. Cavan and Sainsbury, in their surveys of urban populations, found that the incidence of suicide was relatively higher among the upper and middle classes than among the rest. The class composition of the three cities under investigation is shown in Table IV which also lists the relevant figures for Greater London and the country as a

TABLE IV

Social Class Distribution, per 1,000 Males Occupied and Retired Aged 15 and Over, According to Census 1951

	I	II	III	IV	V
Sheffield	25	117	560	132	166
Leeds	27	135	575	128	135
Burnley	19	118	554	153	156
Greater London	47	162	551	107	133
England and Wales ..	33	150	527	162	128

whole. The upper two classes formed a smaller part of the population in the three Northern communities than in Greater London. The figures for Classes I and II were lower for Burnley and Sheffield than for Leeds. This is in keeping with the fact that the former two cities have a smaller business community than Leeds.

The data listed above showed marked contrasts between Burnley and Sheffield with regard to a variety of factors which are generally assumed to be related to the suicide rate. In the light of these data, the suicide rate would be expected to be high in Burnley and low in Sheffield. On the other hand, the upper two social classes were under-represented in both cities, which would be expected to make for a low suicide rate. The reason why it failed to have this effect in Burnley will have to be discussed.

THE COMPOSITION OF THE SUICIDE SAMPLES BY SEX, AGE AND SOCIAL CLASS

The percentage of females among the total numbers of suicides was higher in Burnley than in the other two cities during the five-year period of 1952 to 1956. In 1956 it was 51·4, thus slightly exceeding the male proportion. The average percentage of female suicides during the above period was 43 for Burnley, 37·1 for Leeds, 36·3 for Sheffield and 37 for England and Wales as a whole.

The Burnley group had a higher proportion of persons aged 65 and over than the Leeds and Sheffield samples. The percentages of persons over 65 who committed suicide were 43·3 for Burnley, 26·5 for Leeds and 34·8 for Sheffield. These figures lent support to the hypothesis that the excessive suicide rates at

Burnley were related to the excessive size of those age groups. However, the age factor alone could not account for the differences in the suicide rates. This was shown by the following calculation.

The incidence of suicide which might have been expected in each sex, in each year from 1952 to 1956, and in the age groups 24–44, 45–64, and 65+ in Burnley, if the same factors had operated as in Leeds, was calculated from the Leeds suicide figures (1952 to 1956) and the population figures in the 1951 Census. The "expected suicide rate" for Burnley in these groups was found to be lower than the real rate. This correction, for comparative purposes, of the age distribution in the two towns, indicates that age differences, though important, do not completely explain the higher suicide rate in Burnley. (It was not possible to carry out a similar comparison with the Sheffield figures, as not all the data necessary for this calculation were available.)

Among factors other than age, those usually regarded as indices of social disintegration, i.e. the proportions of divorced and widowed, and of the illegitimates, are likely to have played a part also. Those indices were higher in Burnley than in the other two cities (p. 1014). At least one of those factors, i.e. the rate of widowed in the population, is related to age.

The role of social class in the incidence of suicide in the three communities is far from clear. The relatively low representation of the upper two classes in Burnley and Sheffield would be expected to make for a low suicide rate in both places. Table V shows the social class distribution among the male suicides in

TABLE V

Social Class Distribution Among the Male Suicides, Occupied and Retired, Aged 15 and Over, in Burnley, Leeds and Sheffield. The Figures are Percentages of the Total Numbers of Male Suicides Belonging to Each Class and Refer to the Years 1952 to 1956

	I	II	III	IV	V
Burnley (69 cases) ..	—	8·8	60·8	13	17·3
Leeds (194 cases)	6·6	11·8	55	6·6	19·5
Sheffield (116 cases) ..	3·7	15·2	55·6	13·2	12·2

the three communities investigated. Comparison with Table IV demonstrates that the first two classes were under-represented among the suicides only in Burnley, while they were over-represented in Leeds and Sheffield. However, as the representation of those two classes in the general population was lower than in England and Wales, their contribution to the suicide rates was probably still lower than in the country in general. Strictly comparable figures are not available, but in Sainsbury's series of suicides in London the degree of over-representation of the upper two classes among the suicides was higher than in Leeds and Sheffield. At any rate, the low representation of the upper two classes in the general population as well as among the suicides in Burnley failed to reduce the suicide rate in that city.

Why this should have been so is open to speculation. It has been shown elsewhere that in the old age groups, the suicide rates of the upper and lower classes tend to decline and to approximate those of the other socio-economic classes. The higher average age of the population and of those who committed suicide in Burnley may partly account for the fact that a low representation of Classes I and II in the general population of that city was not correlated with a low suicide rate.

METHODS OF SUICIDE

In a comparative study of the incidence of suicide in different populations, the methods of self-destruction have to be considered. As not all methods are equally dangerous to life, a local preference for certain methods may increase or reduce the incidence of deaths by suicide. The order of frequency of the methods of suicide used in Sheffield, Leeds and Burnley have been compared.

During the 5 years under review, domestic gas headed the list of methods of suicide everywhere in England and Wales. On the average, 42 per cent. of the males and 55 per cent. of the females had killed themselves with coal gas. The corresponding figures for the County of London was 47 per cent. and 49·2 per cent., for Leeds 55·8 per cent. and 59 per cent., and for Sheffield 44·6 per cent. and 63·9 per cent. For Burnley the separate figures for the two sexes were not available. The figures for persons of both sexes together were 49·3 for the County of London, 51·8 for Sheffield, 61·9 for Leeds, and 65 per cent. for Burnley. The latter town, therefore, had the highest percentage of people who killed themselves with domestic gas. The proportion had been highest in 1956, when it reached 88 per cent. In 1957 it was 87 per cent. and in 1958 it reached 100 per cent., i.e. all people who killed themselves in Burnley during that year had gassed themselves. The actual number of suicides was 26. No general conclusions can be drawn from these small figures but it is noteworthy that the higher the suicide rate was, the greater was the proportion of suicides with coal gas. In all communities investigated here narcotics were second on the list of fatal methods. The proportion of suicide by narcotics ranged from 8·9 to 15·1 in Leeds during 1952–1956, and in Sheffield from 14·3 to 28·9. There was, therefore, in this sample, an inverse relationship between the use of gas and narcotics.

THE ROLE OF PHYSICAL ILLNESS

It was possible to study the records of the Leeds and Sheffield groups of suicides for the prevalence of physical illness and its role as a motive for suicide. Information was obtained from the post-mortem reports, and also from the depositions of witnesses and from suicide notes. Table VI shows the average percentage of the physically ill among the suicides in Sheffield and Leeds during

TABLE VI

Percentage of Suicides in Leeds and Sheffield Who Were Physically Ill

	1952–1956	
	Male	Female
Leeds	64·9	73·3
Sheffield	60·9	60·9

the five-year period, and those in whom physical illness appeared to have been the main motive for suicide. It was not possible to state that it had been the only motive, because almost invariably other factors which may have played an important part in the causation of the suicide, such as social isolation and depression, were also present. The proportion of people aged 60 and over was higher among those suffering from physical illness than among the whole suicide groups. This is shown on Table VII which also demonstrated certain data concerning the groups of suicides in whom physical illness was established post mortem. The illness was regarded as serious if it was incapacitating. From the information available it was possible to distinguish between those cases in

which physical illness had been the main motive for the suicide, and those in which it appeared to have acted only as a precipitating factor.

It is not proposed to present an analysis of the type of physical illnesses found in this case material. The data obtained will be used in a special investigation of this problem.

TABLE VII

Physical Illness Groups. The Figures are Percentages of the Total Numbers of Suicides Who Were Physically Ill

	60 Years+		Physical Illness Serious		Physical Illness Main Motive		Physical Illness Precipitated Suicide		Depressed for at Least 2 Months	
	M	F	M	F	M	F	M	F	M	F
Leeds ..	51·6	56·0	58·7	47·0	20·7	29·6	50·0	40·9	83·4	90·3
Sheffield ..	61·2	51·5	75·7	49·8	34·2	33·9	56·1	49·9	77·9	88·3

The role of mental illness could not be retrospectively assessed in any detail. However, 80 to 90 per cent. of those suffering from physical illness had been depressed for at least two months preceding the suicide. It was not possible to say whether in all those cases the depression had been a reaction to the physical illness. No attempt has been made to diagnose and classify the suicides according to psychiatric categories, as has been frequently done by other authors, sometimes on inadequate information.

DISCUSSION

The striking discrepancy between the suicide rates of the three industrial communities has been found to be related to differences in the age composition of the population and in other factors relevant to the incidence of suicide, especially social disorganization and social mobility. The higher suicide rate in the smallest of the three communities was correlated with a higher proportion of women among the suicides and with a more frequent use of poisoning with domestic gas as a method of suicide. The relative increase of suicide among females has been observed by several workers during the last three decades. Hartelius, studying suicide in Sweden, attributed this trend to "emancipation, secularization and urbanization", which have greatly changed the way of life of the female part of the population. It is no doubt also related to the greater longevity of women, which causes a higher proportion of females than of males to live in social isolation and to be exposed to physical illness.

The excessive representation of old people in the population of Burnley was caused by changes in industry which led to emigration of many members of the younger age groups. Thus, social mobility was higher in Burnley than in Leeds and in Sheffield. However, the degree of the discrepancies between the suicide rates of the three cities appears even higher than could be expected from the quantitative differences between the factors relevant to the incidence of suicide. Psychological factors, which cannot be measured, may have played a part. The effect of social conditions making for a higher suicide rate may be potentiated by superimposed psychological stress. Social changes such as those associated with industrial decline and consequent selective emigration, may enhance suicide proneness, especially among the older age groups. Some such psychological factors may have been responsible for the excessive use of one of the most deadly methods of suicide, i.e. poisoning with domestic gas. There

is no reason for assuming that this gas was more readily available in Burnley than in Leeds or Sheffield. In each of these cities it is available in almost every household. It must be assumed that the urge to die was more intensive in Burnley than in the other two communities, where domestic gas was used as a method of suicide only slightly more frequently than in the rest of the country.

It is often thought that detoxication of domestic gas, or its replacement by natural (methane) gas would result in a drastic reduction of the suicide rate. It is doubtful whether this would actually happen. At Basle, Switzerland, the detoxication of coal gas in 1958 was followed by only a brief decline of the suicide rate which within a year returned to its previous level, hanging and drowning having taken the place of gassing.*

The role of physical illness in the causation of suicide has often been commented on. There is reason to believe that it has been under-estimated in the past. Stewart (1960) reported on post-mortem findings in 122 cases of suicide in an industrial town in the North of England. Only 33 per cent. were free from organic disease. Twenty-seven per cent. had severe hypertension and the rest had "a wide variety of painful, disabling and fear-engendering diseases". Stewart found it impossible to assess how far those diseases had contributed to the suicides, but he concluded that those people had been a group of unfit or seriously ill individuals. As was to be expected in the two samples presented above, the average age of those physically ill was higher than among the whole groups of suicides to which they belonged.

The role of physical illness in the causation of suicide is difficult to assess. Control groups are not available. Routine post-mortem records of suicides are not always as informative concerning the presence of physical illness as those of hospital patients. Relevant figures in the literature vary considerably. Sainsbury found that in a London sample of 309 suicides committed in 1936–1938 physical illness had contributed to the suicide in 36·2 per cent. This is a considerably lower percentage than was found in 1952–1956 in Sheffield and Leeds. It would be rash, however, to conclude that the physical health of people committing suicide in London is better than that of a comparable group in the industrial North. Stengel and Cook (1958) found that in a group of 117 suicides committed in London in 1953, in 63·4 per cent. physical illness may have played a part in the causation of the suicides. The only conclusion which can be drawn from those data is that physical illness with or without manifest symptoms appears to be an important factor in suicides, and that improvement in the physical health of a population is likely to contribute to the reduction of the suicide rate. The difficulty of obtaining control groups for the study of this problem may not be unsurmountable.

Summary

Differences between the suicide rates of industrial communities have been investigated. Contrary to expectation the smallest of three populations investigated had the highest suicide rate while the incidence of suicide in one of the two larger cities was exceptionally small.

Both anomalies could be explained by differences in the composition of the populations and their social mobility.

The excessive suicide rate in the smaller community was associated with an increase of suicides among females and of poisoning with domestic gas. The possible causes of these peculiarities have been discussed.

* I am indebted for this information to Professor Im Obersteg of the Institute of Forensic Medicine in the University of Basle.

Two of the three samples of suicide were investigated for the incidence of physical illness which was found to have been present in about two-thirds of the members of the two groups.

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PSYCHOSES IN GENERAL PRACTICE

AN EPIDEMIOLOGICAL SURVEY

By

ANTHONY RYLE

Two main difficulties are met with in epidemiological studies of mental disorders. Firstly, the problem of finding all the cases occurring in a population, or a representative sample of them; and secondly, the problem of classification.

As regards methods of case-finding, surveys based upon patients presenting in hospital or private psychiatric practice are bound to be a selected group, representing an unknown proportion of all cases occurring, a proportion determined in part by severity, but also by various immeasurable social, cultural and medical influences. This selective ascertainment greatly reduces the value of comparative studies made in different communities, or at different times.

As regards the problem of classification, Stengel (8) has recently reviewed the unsatisfactory state of affairs which exists at present. Even if the present classification is held to be reasonably useful for the purpose of the clinical management of patients, it is far from satisfactory from the point of view of genetic and epidemiological studies, where the methods used in the classification of mild, mixed, atypical and borderline cases may critically alter the results obtained. The object of the present paper is to present some indication of the likely importance of these two factors in epidemiological studies of the psychoses, on the basis of a study of cases encountered in a general practice.

General practice experience of psychiatric illness is itself selective. In the first place, the composition of a G.P.'s list is to some extent determined by his attitudes and interests, and to a large extent by his geographical position. In the second place, patients of unsettled domicile and occupation, and patients permanently hospitalized, are likely to be under-represented on the registered list of a G.P., and these groups are likely to include a high proportion of psychotics. On the other hand, under the N.H.S. the great majority of the G.P.'s registered population who fall ill are likely to pass through his hands at some stage, and he is therefore in a good position to give a relatively complete and long-term account of the serious morbidity of this population. In so far as there is some bias present in the G.P.'s experience of the psychoses, it is complementary to the bias which exists in hospital practice.

An account of the epidemiology of the neuroses in my own practice has already been published (Ryle, 5), in a paper which also describes the age, sex and social composition of the practice population. While the present study cannot offer reliable estimates of the prevalence of psychoses because of their relatively low incidence, qualitative information of clinical and epidemiological interest is provided.

The relation between hospital-based estimates of prevalence and actual prevalence in the community has been studied by Fremming (1) who carried out a biographical survey of an age group of the population of Bornholm. He found, for example, that 42 per cent. of manic-depressive psychoses were treated without reference to hospital, and that, at a given time, only one in 35 of affected patients was in hospital. Watts (9), over a ten-year period, diagnosed

endogenous depression in 387 of 8,000 patients at risk, a rate of 48 per 1,000, and recorded an annual first-attack rate of 5 per 1,000. Two-thirds of these cases were classified as mild, and under half were referred to hospital. Sjögren (7). carried out a study of a rural community in Sweden, and found that nearly all patients with schizophrenia were admitted at some stage of their illness and that 60 per cent. were in hospital at any given time; a figure which is confirmed by Norris (4). Her monograph provides extensive figures from British and foreign studies, in addition to her own investigation of all mental hospital admissions from an area of London over a three-year period. General practice studies, apart from that of Watts, have paid little detailed attention to psychoses—owing, no doubt, to their relative rarity. Logan (3), in a study of eight practices, records the one-year prevalence rate for the psychoses combined (I.C.D. 300–309), as 13 per 1,000 for males, and 41 per 1,000 for females. Kessel (2) in a practice-based survey, found only three psychotics during a year's observation of 911 adults at risk.

Method

A list of all patients on whom a psychiatric diagnosis had been made was recorded systematically in 1958 and has been added to since. The population studied amounts to about 2,000 born before 1950, and the patients selected for study were those suffering from (1) endogenous depression, (2) schizophrenia and (3) mixed psychotic or possibly psychotic conditions. Organic psychoses and senile dementia were excluded, as these conditions carry a high death rate and the study is based upon a register of live persons only. More or less complete records have been obtained for the years 1956–1960, during which period particular attention has been paid to the epidemiology of psychological disorders. An account is given of all ascertained cases, but estimates of prevalence (which are only made for the most numerous group, the endogenous depressions), are based upon this five-year period. The age and sex distribution of the population in December, 1959 (Table I), is used for the calculations of prevalence, as these figures were already available, and as annual changes are known to be small.

Table I

Sex and Age Distribution of the Population and of All Ascertained Psychoses

	Population 1960		Endogenous Depression		Schizophrenia		Mixed Group	
Date of Birth	M	F	M	F	M	F	M	F
1940–49	89	171	0	0	0	0	0	0
1930–39	135	179	0	3	1	1	2	1
1920–29	169	244	3	5	2	1	3	2
1910–19	159	148	0	5	1	1	1	2
1900–09	99	116	1	6	0	0	0	1
1890–99	77	104	1	3	0	0	0	0
Before 1889 ..	73	136	1	4	0	0	0	2
All ages to 1949 ..	801	1,098	6	26	4	3	6	8

1. *Endogenous Depression*

The features considered to give evidence of endogenous as opposed to neurotic depressions, arranged in order of significance, were as follows: manic or hypomanic phases; sleep disturbance characterized by early waking; a

diurnal mood-swing; multiple unprovoked attacks; self-accusation; loss of interest and concentration; constipation, anorexia and weight-loss; a pyknic body-build; a family history of depressive psychosis.

No patient was classified in this group who did not exhibit either early waking, diurnal mood-swing, or a history of hypomanic phases, except for one for whom few details were available, but for whom a hospital diagnosis of depressive psychosis had been made. Cases of involutional depression were not separately classified. Thirty-two patients diagnosed as examples of endogenous depression according to these criteria were identified. Of these thirty-two, ten (30 per cent.) had been admitted to hospital, and a further four (12 per cent.) had attended out-patients, leaving eighteen (58 per cent.) treated solely in general practice. Nine patients (28 per cent.) had received E.C.T., eight (25 per cent.) had received imipramine or one of the mono-amine oxidase inhibitors. The remainder had mostly received amphetamine. Only four patients (12 per cent.) had presented manic or hypomanic phases; twenty-two (70 per cent.) had experienced early waking and the same proportion had a marked diurnal mood-swing. Seventeen patients (53 per cent.), have had only one attack, seven (22 per cent.) have had two, and eight (25 per cent.) have had three or more attacks. Five patients (15 per cent.) had paranoid symptoms; four of these were women between the ages of 50 and 60. A family history of manic-depressive disease was recorded in six cases (19 per cent.). Thirteen patients (40 per cent.) were of pyknic body-build. Cases in which endogenous features may have been present, but the criteria adopted for this study were not fulfilled, were of three groups. One group consisted of mild or transient depressions, arising and disappearing spontaneously, producing only slight or brief physical or psychological disturbance. A second group were those on whom the records were insufficient to permit a confident retrospective diagnosis, and a third small group were those classified as neurotic depressions, in whom some "endogenous" features appeared. One aspect of endogenous depression which distinguished it from neurotic depression was the ease with which the beginning and end of the attacks could be identified from the records. Apart from depressions reactive to particular events, neurotic depression as seen in general practice tends to wax and wane in intensity rather than to present in episodes—a difference less apparent in hospital practice, where referral, admission and discharge may make illnesses appear artificially episodic.

The 32 patients classified as endogenous depression can be divided into the following groups:

A. Classical Manic-Depressive Psychoses (♀1 ♂2)

B. Recurrent Depressions (♀5 ♂1)

C. Single Depressive Illnesses without known provocation (♀10 ♂1)

D. Single Depressive Illness with apparent psychological provocation (♀3 ♂–)

E. Single Depressive Illness with physical and psychological provocation (♀2 ♂1)

F. Manic Depressive Illness provoked by an infection (♀– ♂1)

G. Puerperal Depression (5)
(Some of these have been previously reported (Ryle, 6).

Two epidemiological tables are presented; the prevalence rate, Table II, and the inception (first attack) rate, Table III. Because of the small numbers

involved, these have been calculated for the five-year period 1956 to 1960. These tables demonstrate a marked female preponderance and record an age prevalence pattern in line with hospital experience of manic-depressive disease.

TABLE II

Five-Year Prevalence Rate (Persons) (1956-60) for Endogenous Depression, Classified by Age and Sex

(For population figures, see Table I)

Date of Birth	Males No. Affected	Males Rate per 1,000	Females No. Affected	Females Rate per 1,000
1940–49	0	0	0	0
1930–39	0	0	3	16
1920–39	3	18	4	16
1910–19	0	0	3	20
1900–09	1	10	6	52
1890–99	1	12	2	20
Before 1889 ..	0	0	4	28
All ages to 1949 ..	5	6	22	21

TABLE III

Five-Year Inception Rate (1956–60) for Manic Depressive Psychoses, Classified by Age and Sex

(For population figures, see Table I)

Date of Birth	Males No. Affected	Males Rate per 1,000	Females No. Affected	Females Rate per 1,000
1940–49	0	0	0	0
1930–39	0	0	2	10
1920–29	1	6	1	4
1910–19	0	0	2	12
1900–09	0	0	4	33
1890–99	1	12	0	0
Before 1889 ..	0	0	2	14
All ages to 1949 ..	2	2·5	11	10

If it is assumed that the 32 ascertained cases represent all the cases which have occurred, the disease expectancy rate calculated by Weinberg's method (10), assuming that those born between 1890 and 1940 are at risk, is 6·6 per cent. for women, and 1·5 per cent. for men. This is probably an underestimate for if the average inception rates are calculated for each decade from the figures in Table III and summated, the total rate for endogenous depression is 12 per cent. for women. The adoption of different criteria would radically alter this figure, however. If evidence of both manic and depressive phases were required, only one-eighth of the cases reported here would qualify, and if single attacks of depression were excluded, the rate would be reduced by two-thirds. If all women experiencing their first attack between the ages of 50 and 70 were excluded, and separately classified, the rate would be reduced by a quarter, and if puerperal attacks were excluded the rate would be reduced by a sixth. On the other hand, if less restricted criteria were adopted for the diagnoses of endogenous depression, the rate would be higher.

2. *Schizophrenia*

The criteria used for the diagnosis of schizophrenia were the presence of a characteristic disturbance of thinking (vagueness, inconsequence, blocking), of feeling (blunting, incongruity) or of activity and will (inertia, negativism, catatonic symptoms) often associated with delusions and hallucinations. While recovery may occur from the acute attack, all the patients classified as schizophrenics have some persistent symptomatology.

Seven patients were considered to meet these criteria. Two of these have never attended hospital (Appendix Case 1). Over the past year, three of these patients have been incapacitated for work for long periods and four have presented obvious clinical evidence of their illness.

3. *Mixed Psychotic and Possibly Psychotic Group*

From the point of view of epidemiology this group is of particular interest; some illustrative case histories are provided in the Appendix.

Fourteen patients in all are included under this heading. All but two (Cases 19 and 20) have attended or been admitted to psychiatric hospitals. The following groups are recognized:

A. Toxic psychosis, diagnosed as schizophrenia (♂1) well for seven years since.

B. Schizo-affective disorders (♀1 ♂2)

1. Paranoid and obsessional personality, diagnosed as schizophrenia in adolescence, presenting later with a mixed schizophrenic and manic-depressive picture (Appendix, Case 2).
2. Depressive illness in a schizoid personality.
3. Depressive illness in an obsessional personality with some features of schizophrenia.

C. Episodic paranoid illness in the involutional period (♀1). Hospital diagnosis schizophrenia (Appendix Case 3).

D. Personality disorder, possibly schizophrenic (♀2, ♂1). Hospital diagnosis: (1) schizoid personality, (2) anxiety state (Appendix, Case 4), (3) paranoid personality.

E. Depressive and paranoid symptoms in patients with prolonged neurotic illness two of whom have severe rheumatoid arthritis (♀3) (Appendix, Case 5).

F. Depression, hallucinations and compulsive symptoms with a history of mild neurosis and a brain stem lesion (♂1) (Appendix, Case 6).

G. Paranoid symptoms in patients with cerebro-vascular disease, living alone (♀2) (Appendix, Cases 7 and 8).

Discussion

Endogenous Depression

The inception rate recorded for endogenous depression in this study (equivalent to about 1 per 1,000 per year), while much higher than hospital-based figures, and higher than figures reported by Fremming and Sjögren, is about one-fifth the rate given in the general practice study of Watts. This difference can probably be attributed to Watts' use of less stringent criteria for the diagnosis of endogenous depression. His only non-endogenous group of

depressions (classified as exogenous or reactive) is said to be provoked by environmental psychic factors, superficial in character and responsive to psychotherapy. In my experience, however, a larger proportion of neurotic depressions reflect long-term personality problems and disturbed personal relationships, and some of this group in Watts' practice might be classified as endogenous. It is also quite possible that there is a difference in the actual prevalence in the two populations studied. The lower rate recorded by Fremming, on the other hand, may reflect more stringent diagnostic criteria on his part, but is more likely due to his use of other doctors' records.

Comparing average annual inception rates in my practice with the first admission rates recorded by Norris (4) the practice inception rate of males is about four times the first admission figure, while that of females is eight times the first admission figure. This high female-male ratio in general practice is also recorded in Logan's 8-practice study (3), the ratio for all psychoses being 41 to 13—a sex difference which is probably largely due to the depressive psychoses. These figures, if typical, imply that, of the males who present in practice, twice as many are referred to hospital as are females, a fact which could be explained by the greater readiness on the part of women to consult doctors for mild depression.

Inception rates by age for women (males are too few to calculate), show age trends very similar to first admission rates by age presented by Norris. This suggests that the cases treated in practice are milder forms of the same disorder, rather than earlier manifestations of severe disease, or a separate or ill-defined group of conditions.

Future genetic and epidemiological studies of depressive psychoses must take into account the large proportion of cases treated without referral to hospital (a proportion which is likely to increase with the use of anti-depressant drugs). The diagnostic habits of general practitioners and the readiness of their patients to come to consultation varies, however, and classification presents big problems, even if well-standardized criteria are used.

2. *Schizophrenia and Mixed Psychoses*

Hospital figures probably do reflect prevalence here. It is likely that at least one of the only two cases of schizophrenia in the present series who have not attended hospital so far will eventually need to do so. Diagnostic criteria, however, are of extreme importance; for while 77 patients were classified as schizophrenic, there are 8 further patients in the mixed group who either have been diagnosed as schizophrenic at some stage or who might, with some justification, be so classified. Paranoid conditions other than in endogenous depression and schizophrenia, too, are relatively numerous (5 cases in this series including Appendix, Cases 7 and 8). In fact, of the 21 possibly psychotic patients, excluding those with endogenous depression, a major doubt as to diagnostic classification exists in more than half. While the absence from my series of long-stay hospital cases may inflate the degree of uncertainty, this study would seem to confirm that sounder methods of classification are urgently needed.

Summary

The problems of ascertaining and classifying psychoses are discussed in the light of a study of all the psychotic patients in a general practice. The prevalence of manic-depressive psychosis reported is lower than the rate

reported in the general practice study, but higher than hospital and community studies. Differences in approach which may account for these discrepancies are indicated. Amongst other psychoses, doubt as to classification exists in over half the cases encountered.

Appendix: Case Histories

Case 1

Schizophrenia. Never attended hospital.

Female, born 1913. This patient first gave evidence of disorder aged 38, soon after having an illegitimate child, and a radical mastectomy for a breast carcinoma. The schizophrenia is manifested in florid paranoid delusions, usually communicated in writing on odd scraps of paper, concerned with violence to children, storing weapons, tape recorders, etc. She neglects her appearance and her home, but has managed to hold down a clerical job throughout. The school has recently reported, for the first time, that the child, now aged 11 and of exceptional intelligence, is showing some signs of psychological disturbance.

Case 2

Paranoid and obsessional personality, diagnosed as schizophrenic in adolescence, presenting with a mixed manic depressive and schizophrenic picture.

Male, born 1930. This man had a four-month admission at the age of 18, with a diagnosis of catatonic schizophrenia. Twelve years later he consulted for insomnia, and at that time was suffering from intense ideas of persecution, which he was unable to disregard, although he realized that they were unreasonable. He at no time had any primary delusions. Over the years since his admission he had had three or four phases of depression, accompanied by a feeling of persecution, and some phases of unusual activity and productiveness. He developed severe insomnia, characterized by early waking. After consultation with a psychiatrist, it was considered that he was probably an example of manic-depressive illness occurring in a paranoid personality. He was put on anti-depressants but subsequently needed admission to hospital, his symptoms becoming more schizophrenic in type.

From the point of view of classification this case could be regarded either as schizophrenia, or as manic-depressive disease, or as a personality disorder which in turn might be regarded as consequent upon earlier schizophrenic illness.

Case 3

Episodic paranoid illness in the involutional period classified as schizophrenia.

Female, born 1902. This patient presented in October 1959, with depression and a feeling that people at work talked about her. In December that year, she became agitated, and self-accusatory. She said she had a cancer, but that God spared her the pain. She was admitted to hospital, and depression improved on Imipramine, but her paranoia became more marked for a time. She returned to work but was re-admitted with florid delusions, in March, 1960. She had a brief return of symptoms in August, 1960, January, 1961, May, 1961 and August, 1961, responding to treatment with Stelazine (trifluoperazine). This patient is of pyknic build. Her mother spent a great part of her life in a mental hospital. The age, build, and episodic course of the illness are in favour of a basically depressive diagnosis, but she was classified in hospital as schizophrenic on the basis of the primary delusions and marked paranoid trends. She could, under the I.C.D., be classified as schizophrenia, paranoid type (300.3), as paranoia and paranoid states (303), as schizo-affective psychosis (300.6), or as involutional melancholia (302).

Case 4

Personality disorder, possibly schizophrenic.

Male, born 1923. This patient consulted for impotence in 1957; early in 1960 he complained that people at work had accused him of working too hard. He became agitated and sleepless for two days, and complained that the downstairs neighbour was accusing him of being too noisy. This neighbour was in fact deaf. He quoted remarks passed about him from 50 to 100 yards away, and said there were rumours up and down the street that he was an undercover policeman. He had no insight into his delusions. He was referred to hospital, where a diagnosis of anxiety state with depressive and paranoid features was made. He improved on Niamid (nialamide) and Stelazine (trifluoperazine), and after a few weeks was able to return to work. The hospital classification is of anxiety state (I.C.D. 310) but I would think that schizophrenia, paranoid type (300.3) is a distinct possibility.

Case 5

Depressive and paranoid symptoms in prolonged neurotic illness.

Female, born 1915. This is the case of a woman with rheumatoid arthritis with severe deformities. She developed thyroid deficiency between 1957 and 1959, due to Hashimoto's disease. She was not treated for this until May, 1960. In 1956 she made a suicidal attempt with barbiturates, stated subsequently by the patient to have been a means of making her husband

take more notice of her. Over the ensuing years she became increasingly suspicious of her husband's fidelity, almost certainly with no foundation. Finally in August, 1960, she consulted saying she was troubled in her mind. She gave a long account of her suspicions, and of how she had followed her husband and watched him, seeing cars go by with a woman in it, etc. She accepted psychiatric referral, but was not willing to have her husband interviewed. This would seem to represent a paranoid reaction, based on a long-standing depression, occurring on the context of severe physical disability and deformity, possible exacerbated by hypothyroidism. Possible classifications are paranoid state (303) or neurotic depressive reaction (314).

Case 6

Depression, hallucinations, and compulsive symptoms in a patient with a history of mild neurosis and a brain-stem lesion.

Male, born 1910. This patient presented with nervous dyspepsia and vasovagal symptoms between 1947 and 1953. In 1953 he developed occipital headaches, deafness, more marked on the left, and numbness over the left trigeminal distribution, with nystagmus and a slight left facial weakness. A neurologist diagnosed a brain-stem lesion, probably vascular or demyelinizing. These symptoms slowly left him and have not recurred. In 1954 he became depressed, tearful and irritable, had vivid "deja vu" sensations, hallucinations of his dead mother's voice saying "It will be all right", and he felt compulsions to carry out mathematical calculations in his head. His symptoms abated after a few weeks and have not recurred. The time interval (9 months) between the onset of neurological and psychiatric symptoms, and the lack of evidence of any subsequent progression over 7 years, make it hard to correlate the somatic and psychiatric disorder. On the other hand, the unprovoked appearance of depression, hallucinations, and compulsive symptoms in a man otherwise showing only minor neurotic traits, is hard to explain, and defies classification.

Case 7

Paranoid symptoms in a patient with cerebro-vascular disease living alone.

Female, born 1870. This patient has a hemiparesis following a cerebral thrombosis in 1955, and also suffers from defective vision due to cataracts. In 1956 she complained that her neighbours were abusive. In 1958 she accused them of having unlocked her door and of having eight keys to her flat. She shouts defiant messages to them up the stairs, but takes no other action.

Case 8

Paranoid symptoms in a patient with cerebro-vascular disease living alone.

Female, born 1888. A hypertensive old lady, suffering from angina, and borderline congestive cardiac failure, living alone. She asked for a letter to the Housing Department for a transfer in 1960, as her neighbours were noisy. Three months later she alleged that her neighbours were entering her flat and robbing her, but was unable to produce any evidence of this.

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ATYPICAL MENTAL ILLNESS IN A FAMILY INCLUDING IDENTICAL TWINS

By

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In St. Crispin Hospital, Northampton, there are male identical twins (J.L. and P.L.) who for nearly a quarter of a century have suffered from an atypical psychosis. They were previously studied by Palmer (3). Their sister (B.L.) had a similar mental illness but she obtained relief from a leucotomy operation at an early stage. The mother was also affected, but the onset of illness in her case was later in life. There are two unaffected siblings.

In their text-book *Clinical Psychiatry*, Mayer-Gross, Slater and Roth (2) say ". . . Leonhard (1) has shown that rare families are to be found in which an atypical psychosis runs true to form through several members; and in such cases we may very likely be dealing with a heredo-familial disorder *sui generis* . . . He has also pointed to the fact, frequently noted by clinicians, that where there is a strong family history (suggesting a dominant gene) the clinical course tends to be atypical and benign".

This family provides an example of this type of illness, and the presence of a pair of identical twins enhances the interest of the study.

Case Histories

P.L. Birth weight 3 pounds. Delicate, but soon caught up. No neurotic traits in childhood. Normal play and friends. Education: had governess until 10. Then went to prep. school and public school. Was average scholar. Played rugger, cricket and tennis.

Work: Office work for a few years and then went to Agricultural College. Obtained Diploma in Poultry Farming. Was Victor Ludorum in sports. Good relationship with other students. Later started poultry farming and horse dealing. Mental illness began at about the age of 23. He complained of depression, loss of interest, feelings of perplexity and of unreality. There were no delusions or hallucinations. He was admitted to hospital two years later and had 20 convulsion treatments with only slight improvement. Over the years there has been a gradual general deterioration in his condition. He has become careless in his dress, and dirty in his habits. When seen at this hospital at the age of 48 he was depressed, easily moved to tears, and showed lack of self-respect. He remains a depressed, untidy and degenerated person. His I.Q. is 91 and psychological testing indicated 32 per cent. mental deterioration. Clinically, however, there is no evidence of organic dementia. There is still no evidence of thought disorder, and his conversation is rational.

J.L. Birth weight 5 pounds. Not delicate, No neurotic traits in childhood.

Education: Same as P.L. Was captain of House Rugger XV.

Work: Office work 4 years. Later joined P.L. in poultry and horse dealing.

Mental illness: Came on 2 years after onset of P.L.'s illness. Onset, sudden "like a flash". Was depressed and felt life not worth living. Himself attributes onset of illness to worry over P.L. Was in hospital with P.L. at age 25. Not much response to treatment by convulsions. Married in his late thirties. Has one son. Was admitted to this hospital at age of 48 a few months after P.L. Features of illness similar to P.L. possibly less severe—J.L. has always been the more dominating of the twins. He is also much heavier (now weighs 15 stone—P.L. only 10 stone 12 pounds).

He remains depressed and shows gross deterioration of habits. His I.Q. is 105. Psychological testing indicated 24 per cent. of mental deterioration but again, clinically, there is no evidence of organic dementia. There is no evidence of thought disorder.

The outstanding features of the illnesses in these twins are:

1. Depression coming on early in life, with much weeping.
2. Feelings of depersonalization.
3. Deterioration in habits and loss of self respect.
4. Absence of any cyclic features.

5. Absence of thought disorder.
6. Absence of gross intellectual deterioration.
7. The relatively benign course of the illness over a period of nearly a quarter of a century.

The blood groups of the twins are identical. They are both A_2C_cDE, probable genotype CD_e/cDE. In the finger prints there is no discrepancy which would indicate other than that they are identical twins.

B.L. Normal birth. Happy childhood. No neurotic traits. Confirms good sibling relationship all round. Parents?—"None of us could have got on better with them"—Too lenient rather than overstrict.

Education: Private school, average scholar. Liked school games and company. Left at 17 years.

Work: Helped in the house, cleaning silver, sewing, etc. Later tried teaching privately, but without much success. At 26 years she married. Has one daughter of 17 who is very well.

Mental illness: First symptoms at age 18 were of mild depression from which she recovered. At 28 had recurrence after appendicectomy. Admitted to hospital age 29, at which time she denied feeling depressed but complained that she was unable to worry, unable to realize anything and unable to feel emotions.

She had a course of continuous narcosis with some improvement but after discharge she had several recurrences of depression and there was a suicidal attempt.

At the age of 38 she was again admitted to hospital and a prefrontal leucotomy operation was performed. The result was excellent and she has led a perfectly normal life since. She was recently seen when visiting this hospital and was very well. She felt that her illness was similar to that of P.L. and J.L. and regrets that they would never agree to leucotomy for themselves.

Mother (*Mrs. L.*), was the fourth of six children. Her father was "intemperate" (alcohol). One sister had occasional epileptic fits.

Pre-morbid personality. "Very charming, even temperament, interested in village life and farm work."

At the age of 45 had nervous breakdown lasting three months with symptoms of depression and fear of being alone but with inability to meet and converse with people.

Again at age 62 began to lose interest in her appearance. Became depressed and despondent. Onset sudden—"in a night". Husband quoted her as saying she felt that "an evil spirit had entered her". Since onset "nothing had been the same". She complained that she could not think, that her head was like brass, and was light and empty as if it did not belong to her. She felt that both the world and herself were unreal and she "feared insanity".

Summary and Conclusion

The case histories of four related patients are briefly described. All have been afflicted by atypical psychoses. The positive features common to all of them are a sudden onset with depression and marked feelings of unreality and loss of self-respect. The similarity in the illnesses of the identical twins is most striking.

The family provides an example of a heredo-familial disorder with atypical features and a relatively benign course. The response to leucotomy in one patient is noteworthy.

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AUTOBIOGRAPHIES OF FORMER MENTAL PATIENTS

ADDENDUM

By

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and

HUMPHRY OSMOND

In a previous article (1) we listed a large number of published autobiographies of former mental patients. As far as we knew, this was the only extensive list of autobiographies that met certain specified criteria: the author had been a patient in a mental hospital; the book was frankly autobiographical; and the book was devoted primarily to a description of mental illness or mental hospitals. In our original article we requested that our colleagues send us titles that we had overlooked. The response was very good and it is only lack of space that compels us to omit a list of all the people who helped us. However, we must mention our debt to Professor Carney Landis who supplied us with a list of his own, many of which are classics dating back to the sixteenth century. We understand too that Professor Landis and also Dr. Walter Alvarez are each writing books describing their work with very large collections of autobiographies.

It should be noted that this list contains very few books in languages other than English. This is unfortunate, since autobiography represents one of the richest sources of information regarding cultural variations in mental illness and its treatment. Our new list contains only two such books, one in English and one in Spanish, and one article in German. However, several of the other books had originally been published in languages other than English. Yet we do hope that this will encourage some colleagues in other lands to compile lists of their own so that these may be added to a collection of books that presents a valuable and indispensable picture of mental illness as seen by the patient.

Here then are titles of books and articles which were not included in our original article. It should be noted that we have not had the opportunity to examine a number of these books, and we were forced to rely on the description provided by the person who told us of the book.

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THE PRECIPITATION OF JUVENILE DELINQUENCY

By

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THE term "stressor agent" was first introduced to medicine by Selye (1950). Stressors really referred to patho-physiological phenomena associated with shock-like mechanisms, but psychiatrists have made use of the concept and to them stress implies mental conflict, anxiety-tension and defensive re-organization in relation to unpleasant psychic events. This re-organization might be maladaptive and lead to neurotic or deviant behaviour. It is always difficult to isolate a distressing event and attach prime importance to it in the aetiology of psychiatric disorders. What is minor discomfort for one, calling for minor adjustment, may represent severe pain for another by touching on some specially sensitive aspect of the personality, causing drastic emotional and behavioural changes. With these reservations in mind it is possible to extend the psychological concept of stressors to include the field of juvenile delinquency.

The following impressions are based on a study of 500 delinquent boys who have passed through a Remand Home. The interview situation was used to elicit areas of anxiety and sensitivity. In many cases it was possible to isolate a single, stressful event which had proved too much for the boy. After the shock of this "key-event", there seemed to follow a latent period commonly around eighteen months. During this time there were many features of morbid anxiety. School performance fell off, truancy and psychogenic symptoms appeared. There was a striving to adapt and re-organize, but this was so often associated with poor resources such as indifferent health, poor intellect and bad environment.

Bereavement: 38 boys suffered extreme distress at the death of a parent or sibling. As Lindemann (1960) points out, bereavement is a special social stress, for there is a complete cessation of interaction with another emotionally relevant person. Instead of the normal self-limiting grief-reaction, there was a prolonged working over of the bereavement experience. After many months, the deceased was still the focus of the perceptual field to the detriment of its other contents.

There were four instances of severe distress where a boy had witnessed sudden death of a relative. A mother was seen to cut her throat and three brothers were seen to drown. Each child experienced the feelings of horror, uselessness and relief at not being involved personally, so often seen in the traumatic neuroses.

Loss of Relatives in Other Ways: 37 boys experienced particular distress at the loss of a near relative either by desertion, divorce, imprisonment or emigration. In each case, the distress was connected with particularly strong emotional ties and the inability to find satisfactory substitutes.

Paternal Illness: There were 10 instances where sudden paternal illness seemed to lie behind subsequent delinquency. The illnesses were coronary-type heart attacks, "strokes", surgical emergencies or severe psychotic illnesses. In every case there had been a threat of death and the father had been admitted to hospital.

In all the cases so far quoted, a morbid interpersonal relationship existed. There are connections with Lindemann's (1960) work on dyad relationships in schoolchildren and there is confirmation for his observation that the most severe forms of psychosomatic grief occurred when the departed was the most significant person in the social orbit and supplied most of the satisfactions and role-functions which were impossible without him.

Step-parents: Out of 78 delinquents with step-parents, 6 found the demands of the new relationship too difficult. In spite of the new parent attempting to form a good parent-child relationship, friction developed, stemming from the child, and led to frustration and rejection by the step-parent.

Disruption of Family Life: Alterations in the cohesion and integrity of the family unit were particularly traumatic in 19 instances. Such events as leaving the family to live with relatives because of economic crisis, or rejoining the family after being in hospital or open-air school, led to feelings of displacement and rejection. The delinquency appeared as an indirect expression of aggression.

Changes of Environment: It is well known that children are sensitive to sudden changes of environment and Wolff (1960) mentions the ensuing effects which engender stress and evoke major reactions, inappropriate in kind and amount. Twenty boys had particular difficulty in adjusting to new towns or new schools and delinquency appeared after the appropriate latent period.

Illegitimacy and Adoption: Many adolescents pass through a period when they wonder if they are living with their real parents or if they might not be illegitimate. If their doubts have any foundation, severe emotional upset and insecurity may follow. Nine boys at puberty had their worst fears confirmed; depression, defiance and delinquency followed.

The Effect of Brain-damage: Although Lutz (1949) showed that the effects of brain damage in children were usually benign and transitory, 9 boys suffered a change of personality following head injury or encephalitis. Because of their peculiarities, they became children for others to avoid. Rejection, frustration and deepening conflicts ultimately led to delinquent behaviour.

Conclusions

At a time when so many workers are engaged on scientific studies in the field of juvenile delinquency, it seems appropriate to examine in a clinical setting the impact of environmental stress on individual delinquents. As the personality of a delinquent child unfolds in a bleak environment, so it must be sensitized to unpleasant stimuli. He must continually be using his internal resources to counteract this chronic stress. Eventually the time must come when the limit of tolerance is reached and any further insult is likely to lead to maladaptation.

It has been possible in this study to isolate in nearly a third (148) of the cases, a group of psychological "stressors", which were thought to be the precipitating agents of disorganization and maladaptation, one of the consequences of which was subsequent delinquent behaviour.

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OBSESSIONAL PERSONALITY AND ANAL-EROTIC CHARACTER

By

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Popular psychiatric terms are often used uncritically and it is salutary to examine our usage from time to time. "Obsessional" is such a word; it may describe a symptom or a type of personality, with immediate possibilities of misunderstanding. Here it is used to describe a type of personality, as in the phrase "obsessional personality". The current usage of this phrase will be examined and it will be compared with the usage of the "anal-erotic character" of psychoanalysis. The two terms differ: the obsessional personality is purely descriptive while the anal-erotic character is based on a theory of personality development; yet they are often used synonymously. Do they differ in descriptive detail? If so, how and why? An attempt will be made to answer these questions by an analysis of descriptions of the terms.

The Obsessional and Anal-Erotic Characters

The existence of a number of traits commonly occurring together and forming an "obsessional personality" is accepted by most clinical psychiatrists. At the beginning of this century Kraepelin wrote of the pedantry and concern over trivialities in the premorbid personality of obsessional patients, and Janet (9) described the generally accepted picture at length. The traits usually included in the description are: "excessive cleanliness, orderliness, pedantry, conscientiousness, uncertainty, inconclusive ways of thinking and acting; perhaps also a fondness for collecting things, including money; sexual disturbances, though not of any characteristic sort, are common" (Lewis, 12).

A rough and ready practical description of this kind is open to criticism on the grounds of imprecise definition of its component traits and lack of proof of their co-existence. Lewis (11) noted that the traits could be restricted to one field and absent in another; a person might be over-orderly, but not scrupulously clean and not a collector. He did not consider the evidence for the obsessional personality complete.

Despite these reservations, a description of obsessional personality is entrenched in most standard textbooks. Of eight examined (six British and two American) only one (Henderson and Gillespie, 7) contains no such personality profile. With this consensus it can be assumed that the obsessional personality exists; it can be defined provisionally as what psychiatrists say it is. It is then possible to investigate their statements for agreement and consistency.

The anal-erotic character was first described by Freud (6) in 1908 as a "triad of characteristics which are almost always to be found together—orderliness, parsimoniousness and obstinacy". He suggested that they arose from the dissipation of anal-eroticism and its employment in other ways. This interpretation was elaborated by Fenichel (4); frugality represents a continuation of the anal habit of retention, orderliness an elaboration of obedience, and obstinacy a rebellion against the environmental requirements covering the regulation of excretory functions. Like other psychoanalytic

theories this one is difficult to test experimentally. Orlansky (17), reviewing the relation of infant care to personality, concluded that information in the field of sphincter training was too meagre either to substantiate or disprove the Freudian theory. Since then Sewell (20) has tried to correlate toilet-training practices and personality ratings made at five years of age. No differences were found between those with late and early bladder or bowel control, nor between those punished for toilet accidents and those not. Personality structure in adult life would have to be included before the results could be considered conclusive.

In fact the theory has been modified by later psychotherapists. For example, Horney believes that instead of relating these traits to the anal sphere they should be understood as a response to the sum total of early environmental experiences, and Sullivan discussed "preoccupation" in childhood as a precursor of obsessional development. Such trends in theory away from toilet training to more general environmental disturbances in childhood make the theory even less testable.

Again, disputes will be set aside and the assumption made that the anal-erotic character is what psychoanalysts say it is. A similar investigation should yield a profile which can be compared with the description of the obsessional character. By comparing the results it will be seen whether or not the current usages of "obsessional personality" and "anal-erotic character" differ.

Method

The collected statements of authors about the obsessional and anal-erotic characters were studied by the method of comparative matching (Raven, 18). This technique was developed to provide a method of comparing patients' statements and has been used with success in follow-up studies (Frankl and Mayer-Gross, 5) and in constructing personality profiles of groups of patients (Hetherington and White, 8; McAdam and Orme, 14). It permits comparison and grouping without losing sight of the original material, and allows some quantitative assessment of material not lending itself readily to conventional statistical methods.

Each distinct statement of the authors is recorded on a filing card. For example, the sentence "they are obstinate and stubborn" would be entered on two cards as "obstinate" and "stubborn". The cards are then sorted on a large surface, those that have the same or similar meanings being placed together. When they have been matched in this way into as small a number of piles as possible, each pile is labelled and each card is marked according to the pile in which it has been placed, to identify its position later. After an interval the cards are shuffled and a new sort is made. Each card is marked again to show its position in this second sort. After a further interval a third sort is carried out and noted. Finally the cards are sorted again, this time according to the first three sorts now recorded on each card. Some cards will have been together in all sorts and these provide categories on which there has been agreement on each occasion. With these established, other cards, which have been once in one category and twice in another, suggest relations between the categories or the possibility of amalgamating closely related categories. For example, the description "obstinate" was twice placed in a group of statements relating to persistence and once in a group relating to rigidity, suggesting that the categories of "persistence" and "rigidity" are related to each other.

Those categories that have many "joining statements" of this kind are closely related, those that have few less closely. If two categories have no

statements in common they can be regarded as distinct and unrelated. In this way a subjective but disciplined sort is made which eventually assumes a hierarchical structure. The stress laid on the various categories is evident in the number of statements each contains.

The first three sorts should be carried out by three different people. The final sort then provides a consensus of opinion on the grouping.

Many of the problems of arrangement are as much semantic as psychiatric. Many synonyms occur and in doubtful cases a dictionary and Roget's Thesaurus are helpful.

The results of the technique can be presented in two ways: as a table showing the main categories derived and their incidence, and as a detailed composite verbal portrait of the personality, entirely composed of words and statements from the original sources.

For the obsessional personality eight textbooks were selected as representative of current conventional psychiatric teaching (Curran and Partridge, 2; Ewait, Strecker and Ebaugh, 3; Henderson and Gillespie, 7; Lewis, in Price, 13; Mayer-Gross, Slater and Roth, 15; Noyes, 16; Skottowe, 21; Valentine, 22). Of these six are British and two American. In all 113 statements were obtained and analysed.

To provide similar material for the anal-erotic character sources were selected in a different way. Psychoanalysis emphasizes original sources and it was appropriate therefore to examine the classical papers on the subject—those by Freud (6), Abraham (1) and Jones (10). These three papers furnished 90 statements which were analysed by the same comparative matching technique. As there was agreement among the authors on the three main categories laid down by Freud these were used to name the categories nearest to them that emerged in the sorting. The results are presented in the same way as those for the obsessional personality.

Results

Table I

The Obsessional Personality

Main Categories	No. of Statements	Subcategories	No. of Statements
Inertia*	41	Inert	9
		Rigid	15
		Persistent	17
Inconclusiveness ..	31	Inconclusive	12
		Repetitive checking ..	6
		Fearing error ..	4
		Uncertain	9
Orderliness ..	25	Orderly	17
		Liking discipline ..	8
Mood Changes ..	9	See description	
Others	7	See description	
Total statements ..	113		

The Obsessional Personality—Composite Description

(Numbers in brackets refer to the number of times the word or phrase occurs; unnumbered words or phrases occurred singly).

*Inertia**

They are dull, slow, inhibited, cautious and deliberate. They are unoriginal and unlikely to realize their potentialities.

They are *persistent*, overconscientious (4), dependable (2) and have considerable qualities of endurance (2), and drive (2). They are reliable and dogged and may be obstinate, stubborn and self-centred (2). They are *rigid* (5), inflexible (2) and unadaptable (2). Their ideals and standards are high and rigid and they are unwilling to discuss or modify them although they put them before self interest. They are austere and unapproachable.

Inconclusiveness

They are *inconclusive*, indecisive (5), vacillating in behaviour and thought, cannot leave well alone and make unsatisfiable attempts to reach order and perfection. They are always busy and never finished, harassed by responsibilities, and cannot work under pressure.

They *repeat and check* (3), repeatedly and needlessly make sure, and weigh the pros and cons of decisions.

They *fear error*. They are afraid of making mistakes or omissions, have moral scruples and fear transgressing the social code.

In general they are *uncertain of themselves* (2), insecure, worrying, doubting and hesitant, but try to hide it.

Orderliness

They are over-orderly (3) and live by routine (2), being upset if it is disturbed (2). They are meticulous (4), perfectionists (2), sticklers for precision (2), hairsplitters, and give their history with detail and care. They are fastidious, overneat (2), overtidy and overcleanly.

They are *fond of discipline*, adhering to rules and regulations themselves while being strict and domineering in their application to others. They conform carefully to their religious and moral codes, are formal in manners, and usually select a cut and dried religion. They have an exaggerated sense of duty.

Mood Changes

They are hypochondriacal, attentive to their bowels and to any trifling bodily sensation (2). They may be irritable, morise, and have neurasthenic or depressive tendencies, although they are not subject to swift changes of mood.

Others

Other characteristics noted singly are submissiveness, introversion, parsimony, a fondness for collecting and a tendency to be superstitious. Some are day-dreamers and a few have sexual sadistic fantasies.

Anal-erotic Personality—Composite Description

Obstinacy

They are *persevering* (5), thorough (3), reliable (2), conscientious, determined, dogged, and persistent. This may lead them to be called obstinate (3), stubborn or defiant. Added to this is a quality of *selfwilled* (3) *independence*.

* These features are called *inertia* in the sense that they are difficult to move but once moving difficult to deflect (Mayer-Gross *et al.*, 16).

They are individualistic and must do things their own way (2), disliking interference (2) and believing that no one can do them as well as they can (3). They refuse to accommodate themselves to others' arrangements.

In extreme cases their obstinacy and self-will make them *power-loving*, tyrannizing, dictating, hypercritical, carping, and they may be vindictive (2), revengeful and envious.

Orderliness

They are orderly, fond of indexing and tabulating and have powers of organization. They crave symmetry (2), accuracy, "fair play" and believe there is a "right" way to do every task. They are often called pedantic (3), and perfectionistic (2). They lay emphasis on bodily cleanliness (2).

Parsimony

They are parsimonious and avaricious but may be generous and extravagant. They are interested in property and possessions (2), especially money (2). They collect (2), hoard (2) and gather objects. They are concerned over wasting time.

Procrastination

They procrastinate (2) and postpone action (2), leaving the initiative to others and interrupting actions they begin.

Mood

They are irritable, irascible, surly and malcontented, morose, unhappy and hypochondriacal. They are inaccessible but can be unusually tender.

Inertia

They are slow and heavy thinking, unproductive and avoid effort.

Others

They tend to be occupied with the reverse side of things (2) and to enjoy painting and modelling.

TABLE II

The Anal-Erotic Character

Main Categories	No. of Statements	Subcategories	No. of Statements
Obstinacy	41	Persevering	19
		Self-willed, independent	13
		Power-loving	9
Orderliness	15		
Parsimony	11		
Procrastination ..	6		
Mood changes ..	9		
Inertia	4		
Others	4		
Total statements ..	90		

DISCUSSION

A comparison of the two tables and the two descriptions shows that the main categories have much in common. Although the names selected for the main categories vary slightly there is agreement on the importance of orderliness, persistence and rigidity. Although less frequent, irritability and depression are common to both. For each category a counterpart can be found except for a few traits mentioned singly in each. The differences are in emphasis.

The description of the obsessional personality shows a greater emphasis on inconclusiveness and on related fears, doubts, and checking activities. This suggests an overlap or continuum between these traits and the symptoms of obsessional illness which is not evident in the anal-erotic characteristics listed.

The anal-erotic character contains more terms of opprobrium. Persistence is called obstinacy, rigidity welf-willed independence, and a regard for discipline becomes love of power. Items which appear only in the anal character, or which receive more prominence there, are more obviously derived from the underlying theory, for example, the stress laid on parsimony and the item concerning the reverse side of things.

Much of the difference in emphasis can be traced to words that not only describe a trait but imply that it is used either successfully or unsuccessfully in the individual's adjustment. Thus a person whose regard for order and method is successfully utilized will be called conscientious and thorough, while a person with the same regard for order and method may be called pedantic, bureaucratic and a petty disciplinarian when his adjustment is poor. The words used in both cases refer to the same quality—in this case orderliness—but by the judgment implicit in them they make a comment on the success or failure of the individual adjustment. By selecting appropriate words it would be possible to construct two ideal personalities—one described in terms of success, the other in terms of failure. The personality described in successful terms would be one in which perseverance led to success, orderliness brought clarity and results, and insistence on checking was only sufficient to avoid errors. The personality described only in terms of failure would be one in which orderliness and discipline had become ends in themselves, in which inconclusiveness and fear of error made any task endless, and in which rigidity had become a barrier to originality and invention.

By itself, this does not account for all the verbal differences between the composite portraits. There are two different sources for accounts of the obsessional personality and the anal-erotic character: observations of the patient's behaviour and the patient's subjective account. The amount of objectivity shown by obsessional personalities in describing their traits varies greatly. A person regarded by outside observers as fanatically tidy may agree, may rate himself untidy, or claim that he does not think tidiness more important than do others. This "insight", or its lack, varies greatly from patient to patient, and if the patient's account is used alone, as in questionnaire assessment, accurate appraisal may be impossible. Those personalities who do not regard themselves as abnormal are likely to have certain terms used about them with this judgment implicit in them. Their persistence is called obstinacy and they may be labelled domineering, carping and critical. They believe that their way is the best way.

If it is accepted that most terms used to describe obsessional traits contain a comment on their "success" or "failure" or on the patient's self-awareness or "insight", the different emphases of the two composite portraits are

explicable. The anal-erotic character describes obsessional traits in successful terms. Where failure is implied it is in the direction of failure to get on with others; others suffer rather than the person described. The description of the obsessional personality contains terms implying success, but lays more emphasis on failure in the other direction—that in which the person suffers rather than others.

Sandler and Hazari (19) obtained two vectors from a factor analysis of the responses to 40 items relating to obsessionality made by 100 neurotic patients. The patients were not necessarily obsessional neurotics or obsessional personalities. The two vectors were labelled "reactive narcissistic" and "obsessional". The items making up the first groupings are all related to orderliness and persistence while those making up the "obsessional" vector concern inconclusiveness and definite symptoms of neurosis, for example, anxiety, compulsions, phobias, obsessions and ruminations. These findings support the idea of a dichotomy between successful and unsuccessful obsessionality and suggest a link between unsuccessful obsessional traits and symptoms of illness. The questionnaire method employed cannot take into account differences in "insight".

In brief, the comparative matching technique indicates that differences in the current usage of the two terms are slight. They can be explained in terms of success or failure and "insight" or its lack. Since these judgments are already implicit in the vocabulary of the psychiatrist, it would seem worth while to make them explicit in any clinical research on obsessional traits. This would involve comparing the patient's self-assessment with that of the observer or relatives to obtain a measure of "insight", and rating each trait in regard to its effectiveness for the individual—its success or failure. It is possible that such an analysis might yield information of practical importance in determining which obsessional personalities are likely to break down, either with obsessional, depressive or other psychiatric symptoms.

This first application of the comparative matching technique to psychiatric usage shows that a useful composite picture can be obtained. Further applications in this area can readily be seen: to provide representative opinions for teaching purposes, to compare past and present usage, or to contrast usage in different schools of psychiatry in different countries.

Summary

1. The technique of comparative matching is used to construct a representative description of the obsessional personality from current textbooks and of the anal-erotic character from psychoanalytic writings.

2. Comparison of the two descriptions shows that they differ only in emphasis.

3. The differences are explained in terms of the success or failure of each trait in personal adjustment and the degree of insight present.

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ASSOCIATION, AGNOSIA, AND INTELLECT

By

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"O the mind, mind has mountains; cliffs of fall,
Frightful, sheer, no-man-fathomed."
Gerard Manley Hopkins.

THE importance of the anatomical basis of the simpler motor and sensory functions of the central nervous system, and their disorders, has been recognized for over a century (Brown-Séquard, 1855). But that more complex intellectual functions and their disorders should also have a relevant anatomical substrate is only slowly coming into recognition. Indeed, a still-fashionable theory of mental function, originating in Vienna towards the end of the last century, regards the study of brain structure as unnecessary and beneath contempt—for all that its founder began as a neuro-anatomist.

The advent of psychosurgery (Moniz, 1936), and, particularly, recent observations on the effects of surgical intervention in the temporal lobe, have re-awakened interest in the physical basis of mental function. Data gained from such experience have made it possible to attempt an integration of anatomical and psychological information to explain mental phenomena.

Anatomical Considerations

Von Monakow (1914) was the first to point out that retrograde cell degeneration occurs in the thalamus following cortical ablation. Since then, this work has been extended in the macaque (Clark and Boggon, 1935; Clark, 1936; Walker, 1938), and in man (Feremutsch and Simma, 1959). It has been shown that the primary motor and sensory cortices receive specific (point-to-point, somatotopic) afferents from the ventral group of thalamic nuclei, which in their turn receive somatotopically-organized extra-thalamic afferents. The (sensory) association cortex may be defined as those regions of the parietal, occipital, and temporal neocortex which are not primary somatic, auditory, or visual sensory receptive areas (Penfield and Rasmussen, 1950), i.e. regions which are not the projection zones of the ventral thalamic nuclei; Rose and Woolsey (1949) have estimated that this is 85 per cent. of the human cortex (including frontal "association" areas). In terms of thalamic dependence, the sensory association areas may be divided into two groups: (*i*) the parieto-occipital and superior temporal association areas, which receive a point-to-point afferent projection from the lateral-pulvinar group of thalamic nuclei; afferents to these latter come from within the thalamus, chiefly (if not entirely) from the ventral group. As an example, the situation for somatosensory impulses is shown in Figure 1 overleaf.

These adjacent cortical areas are in fact joined by short cortico-cortical "association" fibres, but the experiments of Lashley (1952), as well as clinical experience of superficial cortical injuries in man, have shown that such fibres are not involved in the (mental) act of association.

(*ii*) The non-auditory temporal neocortex receives a small projection from the pulvinar, but it is not thalamically dependent in the same sense as the other

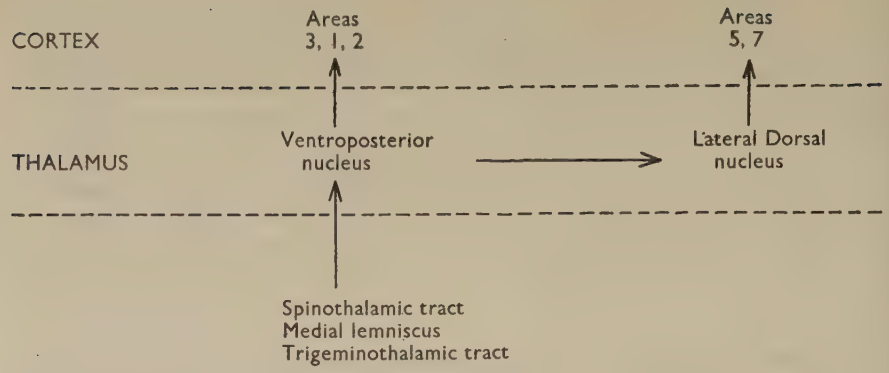

FIG. 1

cortical association areas. Its principal afferent connections are from (*a*) the hippocampus (Votaw, 1960, in the macaque), and (*b*) the thalamically dependent association cortex, by means of long cortico-cortical association fibres. These connections have been most fully explored in the macaque, by both anatomical and strychnine neuronographical methods; they are reviewed by Bonin and Bailey (1947) and Chow and Hutt (1953). Bailey and Bonin (1951) assert that these cortico-cortical connections are essentially similar in man. While the temporal neocortex is richly interconnected with other cortical "association" areas, it does not receive fibres from the primary motor and sensory cortices.

The relationship between the primary sensory cortex and the two types of "association" cortex, together with their functionally significant sub-cortical connections, is shown, in general terms, in Figure 2:

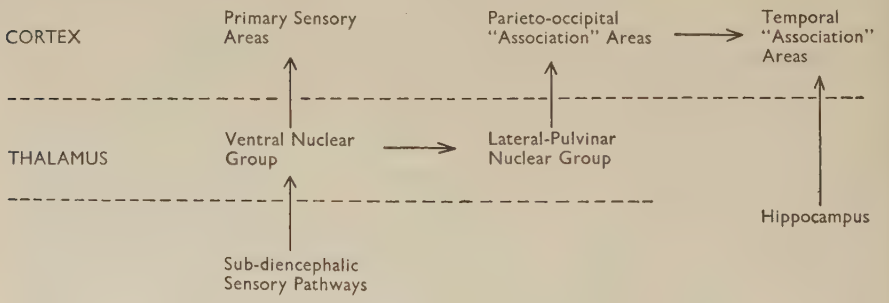

FIG. 2

Anatomically, then, there are two distinct types of "association" cortex, which differ considerably in their connections. The clinical evidence should be examined with reference to these connections, in an attempt to assess their functional significance.

CLINICAL CONSIDERATIONS

It is known that lesions of the parietal somatosensory "association" cortex, or of its specific thalamo-cortical projection, produce a well-defined type of agnosia; it is in fact often called "nominal aphasia", in reference to the resultant motor (speech) response. The interesting thing about it, in the present context, is not that the patient cannot name, for example, a key introduced into his hand;

but that he can say, without giving the name, "This is for opening doors". In other words, the cognitive act required to name the object is impaired, but the interpretative act required to describe its function is intact. Similarly, lesions in the thalamically-dependent visual or auditory "association" areas lead to disturbances only of cognition of visual or auditory stimuli. Larger lesions, of course, may impair more than one of these "modalities" of cognition.

The temporal lobe syndrome cannot be so easily assessed by simple tests; this is particularly true of surgical temporal lobectomy, in which structures other than neocortex are usually damaged. Perhaps the simplest type of case to consider in the first instance is the aura produced by the discharge of an epileptic focus known to be in temporal neocortex. Such aurae consist of complex hallucinations involving the integration of sensory data from several different sources.

In the intact brain, it may be assumed that cognition in somatosensory, auditory, and visual modalities in the appropriate "association areas" occurs as the first part of the mental act of association. This information is transmitted by cortico-cortical pathways to non-thalamically-dependent temporal neocortex, where it is integrated and interpreted. Thus, Penfield (1958) has written: "The production of interpretative illusions by local epileptic activity or electrical activation [in temporal cortex] suggests that [this] cortex contains a mechanism which is normally employed in the interpretation of current experience. This interpretation includes comparison of the present with selected past experience."

Temporal epileptic aurae may also take the form of compulsive "memory patterns" (Penfield and Jasper, 1954). Surgical experience has shown that bilateral, or extensive unilateral, interference with the hippocampal formation leads to serious defects of recent memory (Scoville and Milner, 1957; Walker, 1957). Thus it would seem that the ability of the cortex to retain experience (memory) is dependent on the integrity of the projections from the hippocampus to the temporal neocortex.

It is a matter of definition whether or not memory constitutes a part of intelligence. But in general it may be said that intelligence is made up of a variety, or perhaps a succession, of anatomically localized cerebral functions. Cortical lesions at any site may affect "intelligence" in so far as they interfere with the subject's ability to appreciate (primary sensory), recognize (parieto-occipital associative), interpret (temporal associative), or respond to (motor) objects or problems presented to him. Naturally, if cortically-injured subjects are tested in unaffected parameters, their problem-solving abilities are not significantly affected compared with their pre-injury performance (Jarvie, 1960). Only 7 of Jarvie's 71 subjects showed intellectual deficit on such tests; and they all had extensive subcortical lesions in addition to their more superficial (cortical) injuries. Likewise, Milner (1958) has examined over 100 cases of temporal lobectomy before and after operation, and states that "intelligence as measured by the Wechsler-Bellevue I.Q. rating is not permanently affected by these operations".

Data of this kind show that it is no longer possible to attribute intelligence, as a unitary function, to the "mass action" of the cortex as a whole (Lashley, 1929); it must now be defined as the integrated compound of separable functions occurring in different and specific areas of cortex. While there is still every reason to believe that those purely intellectual properties, which so distinguish man from other animals, are a function of the neocortex, it must be remembered that the brain functions as a whole, not as isolated parts or systems. The intact cortex may act as a super-computer, which can be taken to pieces, but "value"

and "weight" are chiefly contributed by sub-cortical mechanisms and structures. The rhinencephalon would appear to be responsible for both the emotional correlate of sensory experience and (specifically as the hippocampus) the emotional "drive" which makes the performance of (cortical) intellectual activity possible.

Summary and Conclusions

"Association" occurs in two phases. The first is cognitive; it takes place in the "sensory association" areas of the cortex, and is anatomically dependent on a thalamo-thalamo-cortical circuit. The second phase is interpretative, and occurs in the non-auditory temporal neocortex; it depends, anatomically, on the integrity of cortico-cortical connections from other areas, and not (in itself) on thalamo-cortical projections. Isolated cortical lesions impair only those functions which are localized in the affected areas. Tests designed to obviate the defective functions therefore fail to demonstrate intellectual deficit. "Intelligence" represents the sum of a number of anatomically and psychologically discrete cortical functions. The ability of the cortex to perform intellectual work, and to retain data, is dependent on sub-cortical mechanisms.

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SENSORY DEPRIVATION

By

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EXPLORATORY experimental work into the effects of sensory deprivation on human subjects has developed rapidly during the past decade and many reports have been published. It would appear to be necessary, however, to pause for a moment and to review the work which has so far been executed with a view to facilitating the systematic investigation of this phenomenon.

The general importance of sensory deprivation can hardly be overemphasized in view of the devastating psychological/psychiatric effects of its application, from which many believe we may obtain clues concerning the development of both normal and abnormal mental states. Clarke and Clarke, for instance (4) argues that extreme isolation (and consequent sensory deprivation) can, and usually does, result in permanent severe intellectual impairment. Bruner (3) makes reference to the "need for variable sensory stimulation as a condition for maintaining a functioning organism" and also to "a need for continuing social contact and stimulation". Harris (10) argues that the exposure of schizophrenic patients to sensory deprivation will shed light on the nature of this illness. These, and other writings (Solomon *et al.*, 21) present cases and examples which testify to the potential value of deprivation studies in general.

Experimental studies of sensory deprivation have used three main experimental techniques. The first, initiated by Hebb and his associates (II) employed the technique which has come to be known as "The Reduction in Patterning". In this type of investigation the subject is restricted to an environment in which variations in sensory stimuli are reduced as far as possible. Thus the subject may be required to lie on a couch or bed in a specially prepared room which may be soundproof and lightproof. He may wear translucent goggles, permitting the entry of light but allowing no pattern vision, and his ears may be plugged with cotton wool. His arms and hands may be enclosed in a cardboard tube. In this way variations in the auditory, visual, or tactual spheres are minimized.

The second deprivation technique owes its existence to Lilly (13) and has been named the "Reduction of Absolute Intensity". It aims at reducing the absolute intensity of all ingoing stimuli. In a typical experiment in this category, a subject will be placed in a tank of water which is slightly below body temperature. He is enabled to breathe by wearing a lightproof mask through which air is pumped. By use of this technique the majority of ingoing sensations are reduced to a minimum.

The third technique has been named "The Structuring of Stimuli" and makes use of the tank type of respirator used for patients with poliomyelitis (Mendelson, 14). Subjects who are undergoing this experience have their arms and legs encased in cardboard cylinders and lie on a specially-built mattress placed inside the respirator. The motor of the respirator produces a dull repetitive auditory stimulus and the subject's area of vision is considerably reduced.

It should be noted in passing that these three techniques are not mutually exclusive, and the distinctions between them are far from clear. For instance, in reducing the absolute intensity of all ingoing stimuli we are, *ipso facto*, reducing

the patterning of these stimuli. Also, in some instances, there seems to be very little difference between the "Structuring of Stimuli" technique and that of reducing patterning. These three techniques would appear to represent three ingenious attempts to deprive subjects of their normal sensory experiences rather than three logical and complementary attempts to manipulate subjects' environments in such a way as to produce maximal information.

All investigators, using any of these three techniques, have invariably reported that their subjects found the experience to be quite a devastating one. Solomon's review (21) presents a fairly general account of this experience as reported by a large number of volunteers.

The present review attempts to systematize the experimental findings, to point out some of the shortcomings, and to make constructive suggestions regarding future experimentation. With at least three techniques at present at our disposal, with a growing number of experimentalists, and with a diversity of interests it is only too easy to see how the field could develop unsystematically over the next ten years, producing very few more facts than we have at present.

I—Work With Normal Subjects

(i) *Studies of Cognitive Changes*

The first study is that by Bexton, Heron and Scott (2) at McGill University. In this study 22 male college students experienced the Reduction of Patterning type of deprivation for two to three days. Intelligence test results given before, during and after the deprivation experience showed inferiority of performance during the isolation period when compared with a control group. This impairment was found to disappear soon after the termination of the experience.

Vernon and Hoffman (23) studied the effect of sensory deprivation on learning rate in human beings. They used essentially a Reduction of Patterning technique although not identical with that of Bexton, Heron and Scott. Using experimental and control subjects (college students) and word lists as criteria of learning, they demonstrated that the ability to learn these lists improved with continued sensory deprivation. This improvement declined to normal levels by 48 hours after confinement. Vernon and Hoffman point out that the discrepancy between this result and those reported by other workers may be due to differences in confinement conditions between the studies. Also the number of subjects used by Vernon was only four.

Wexler *et al.* (27) using a Structuring of Stimuli technique placed 17 males in a tank type respirator for periods up to 36 hours. They concluded that their subjects showed distortions in judgment of the time spent in the respirator, the amount of distortion being proportional to how soon the volunteers asked to be removed from the isolation experience. It is difficult to accept this conclusion in the absence of control data, particularly as the subjects were told beforehand that the experiment would last up to 36 hours. From their table, the five subjects who were able to remain in the respirator for the agreed 36 hours were remarkably accurate in judging how long they had been in!

Scott, Bexton, Heron and Doane (19) carried out a further study explicitly designed to investigate the cognitive effects of perceptual isolation, using a similar technique to that employed earlier. They used two batteries of tests, one given during the isolation period, and one afterwards. The first set of tests (the cubicle battery) had two parts: A, five types of problems from a variety of intelligence tests, and B, association learning, digit span, and analogies. The tests in part A were given before, during, and after the isolation experience,

and those in part B were given shortly before the subject left isolation. The tests in the cubicle battery were given orally. The tests in the "post cubicle" battery comprised Koh's blocks, digit symbol, Thurstone-Gottschaldt figures, transcribing a passage of unfamiliar technical material, the McGill picture anomaly test and a further block design test. Twenty-nine college students served as subjects, and 27 students acted as controls. The results indicated that the experimental conditions produced some deterioration in performance on tests of cognitive ability while the subjects were in isolation and after they emerged. However, the difference between the groups did not increase as time went on. The authors suggest that this absence of progressive deterioration might have been due to the experimental design.

To conclude this section on cognitive changes, there is some evidence that cognition is impaired under some conditions of deprivation. It is not possible to formulate these conditions explicitly, although Vernon puts forward the suggestion that in the Bexton, Heron and Scott study the subjects developed hallucinations which may have been in part responsible for their impaired mental performance. It could equally well be due to the perceptual changes. It would appear to be relatively easy to sort out the relation between deprivation conditions and cognitive functioning particularly as the latter has been adequately systematized. Such sorting out is not likely to be achieved, however, if a miscellany of tests are given to a miscellany of subjects in a miscellaneous manner at the whim of the experimenter.

(ii) *Perceptual Changes*

In this section we will deal with those perceptual phenomena which have been investigated, excluding hallucinatory experiences which will be dealt with separately.

The study by Bexton, Heron and Scott reported a variety of perceptual changes immediately following deprivation experience. Subjects reported an inability to focus, inability to perceive their environment in three dimensions, and supersaturation of colours.

In a more detailed study by Doane *et al.* (5), thirteen tests of visual perception were administered to 13 students after four days of perceptual isolation. They also included further tests of somaesthetic perception and spatial orientation. A further group of subjects experienced visual isolation but were not restricted in any other way. Twenty normal controls were used, and all subjects were tested before and immediately after the isolation experience. The main findings were that tests of Figural After Effects, of size constancy, of acuity, autokinetic, colour adaptation, shape constancy, and after-movement were significantly affected. The tests not affected were those of Critical Flicker Frequency, Phi Phenomenon, Brightness Contrast effects, Brightness constancy, Necker Cube reversals, and Tachistoscopic perception. In respect of the tests of somaesthesis and spatial orientation, there was a statistically significant improvement in the two point limen, deterioration in the Tactual form discrimination test, and impairment in spatial orientation. In summarizing these results the authors conclude that "the results from the visual tests indicate that the most prominent effects are a decrease in the constancies, and an increase in the after-effects of stimulation. . . . Size constancy is markedly reduced, and shape constancy probably reduced". Although this study is probably the most comprehensive one into the effects of sensory deprivation on perceptual processes it suffers from a number of defects resulting

from the apparent desire on the part of the investigators to obtain as much information as is humanly possible. The usual result from such a study is that the conclusions are, at best, indicators for further research. In this study, as the authors themselves admit, as the test battery took about an hour to administer, the tests which were placed at the end of the battery may have suffered less from the effects of sensory deprivation than the tests appearing earlier, although it is not possible to test this hypothesis from the data derived in this study as no control of test sequences was made.

Vernon and McGill (25) determined thresholds for electrically induced pain in eighteen male subjects, nine of whom were then exposed to four days of sensory deprivation, while nine acted as controls. They found that the pain threshold for the confined group decreased significantly after deprivation. The threshold for the non-confined group did not drop significantly over the same period. They thus concluded that sensory deprivation produced a significant lowering of thresholds for electrically induced pain.

(iii) *Hallucinations*

Although most investigators have reported that subjects undergoing deprivation experience hallucinations of one sort or another, these reports generate more problems than they have solved.

In one of the earlier investigations by Bexton, Heron and Scott (2), all subjects experienced hallucinations, which were predominantly visual or auditory. Vernon and Hoffman (23) in their preliminary study were unable to reproduce these findings and suggested that the differences in the confinement conditions were in part responsible for the divergent results. They pointed out that in the former study the subjects were experiencing amorphous visual stimuli (through translucent goggles) together with a repetitious masking noise. The subjects in the Vernon study on the other hand received very little visual and auditory stimulation. The hallucinations might therefore have been *generated* by the amorphous stimuli in the McGill study.

A more thorough investigation into visual hallucinations during perceptual isolation was carried out by Vernon, McGill and Schiffman (24). They classified hallucinations into Type I (flashes of light, flickering light, etc., which lacked shape), Type II (geometrical hallucinations—squares, circles, etc.) and Type III (highly structured integrated scenes). Two types of confinement were used, Phase I being of minimum severity, Phase II of maximum severity. The incidence of hallucinations was determined in a post-confinement interview. Their results indicated that Phase I conditions produced many more hallucinations than did Phase II, i.e. the confinement which permitted more sensory stimulation produced more hallucinations. There was also a relationship between length of confinement and number of hallucinations, with a slight increase in hallucinations as the length of confinement increased. There were no hallucinations of Type III reported in this study. In comparing these results with those reported from McGill in which Type III hallucinations were obtained, Vernon *et al.* attributed this to differences in the confinement conditions, i.e. in the McGill work the subjects were confined for longer periods and wore translucent goggles in an illuminated room. They conclude that confinement which allows no visual stimulation produces a minimum of hallucinations. Confinement permitting a slight amount of light stimulation may produce Type I and Type II hallucinations, while confinement permitting a great deal of visual stimulation but not pattern vision produces the greatest number and the

greatest variety of hallucinations, and that the longer the confinement the greater the probability of hallucinations regardless of confinement conditions.

Doane *et al.* (5) in their investigation of perceptual function above, report an incidental aspect of their study. Of the eleven subjects who wore a translucent mask, eight developed hallucinations. Of the two who wore opaque masks one developed hallucinations, but when they were given the translucent mask both had vivid hallucinations. This result suggested that exposure to diffuse light may have been responsible for the hallucinations. Subsequently five subjects who were persistent hallucinators when wearing the translucent mask were put in complete darkness. Within two hours there was a decrease in hallucinations, which returned on re-exposure to diffuse light, thus supporting the findings of Vernon *et al.*

(iv) *Suggestibility and Susceptibility to Propaganda*

Increases in suggestibility following sensory deprivation were reported by Bexton, Heron and Scott (2).

In a later publication, Scott, Bexton, Heron and Doane (19) assessed the effects of deprivation on susceptibility to propaganda. A group of normal subjects were subjected to perceptual isolation and a recording was played. These subjects proved to be more susceptible to propaganda than did a control group of subjects who did not have the perceptual isolation. This result could have been due, as the authors point out, to the fact that whilst only four of the 35 controls wanted to hear the record more than once, 16 of the 24 experimental subjects asked for repetitions. They argue, however, that this in itself could be attributed to experimental isolation, i.e. the isolated subject would like to hear the record more than would the control subject. It would be of interest to determine precisely how much of the increase in susceptibility to propaganda was due to the larger number of presentations of the record and how much to isolation *per se*.

(v) *Physiological Changes*

Physiological changes have been assessed by a few investigators.

Shurley (20) using a Reduction of Patterning technique reported a general tendency for pulse, respiratory rate, and blood pressure to drop moderately, and for body temperature to increase slightly, following deprivation, although exceptions were noted.

Doane *et al.* (5) attached EEG leads to their experimental subjects throughout their deprivation experience and reported significant EEG changes accompanying the experience. No detail, however, is given.

(vi) *Deprivation Tolerance*

The relation between a subject's ability to tolerate deprivation and other variables has been studied by Petrie *et al.* (15). These investigators employ the concept of "satiability" in which perceptual intensity diminishes after prolonged stimulation with a stronger stimulus. Satiability has been shown to be a general trait independent of the sense modality used, and individual differences in satiability have been shown to exist (Wertheimer (26)). There is also some evidence that susceptibility to satiation may be related to introversion-extraversion (Eysenck and Nichols (6)). Petrie suggests that pain tolerance is related to susceptibility to satiation and inversely to sensory deprivation tolerance. The results of her experiment support this suggestion.

In a further experiment (16) the same authors report further evidence that pain tolerance is related positively to satiation and negatively to deprivation tolerance and point out that satiation may be responsible for these findings.

In a third paper (17), concerned with psychological aspects of pain, Petrie presents her general findings in the following manner, using satiability as her central concept. Briefly, there is a tendency for some people to reduce the intensity of a perception subjectively after they have been stimulated further. This type of person she calls the Reducer. The Augmenters on the other hand, when stimulated by objects will have their perceptions enlarged. The Reducer's ability to tolerate pain, however, becomes a handicap in a situation in which environmental stimulation is minimal. In this case the Reducers can be expected, and have in fact been shown, to render them intolerant of confinement and sensory deprivation.

As a result of probable sex differences in the satiability of women relative to men, in which women have been shown to reduce less than men, Petrie in the same paper, makes the predictions that women will tolerate deprivation better than men, and that hallucinations and other effects of confinement will be less pronounced in women. These predictions await experimental testing, and this work would appear to have important implications for all investigators into the sensory deprivation field.

II—Work with Abnormal Subjects

There is, as yet, comparatively little work done in this field.

Azima and Cramer (1) subjected fourteen psychiatric patients of mixed diagnoses to a reduction of patterning technique specifically to gain some information about the therapeutic value of the disorganization-reorganization sequence of the psychic events and about the problem of depersonalization and body scheme. Two sets of changes occurred, disorganization and reorganization. Azima and Cramer suggest that the disorganization state can be therapeutically manipulated in such a way as to lead to reorganization according to planned patterns.

Harris (10) concluded that his group of twelve schizophrenic subjects who underwent a Reduction of Patterning deprivation technique tolerated the experience remarkably well and showed reduction in the intensity of their hallucinations.

Gibby *et al.* (9) subjected thirty psychiatric patients of mixed diagnoses to sensory deprivation, and employed a symptom rating scale. The main aim of this study was to produce beneficial changes in these patients. They concluded that positive changes for the whole group considerably outnumbered the negative changes although a wide range of individual differences was found, and that the results strongly suggested previously unsuspected psychotherapeutic possibilities of sensory deprivation methods. A control group, which would appear to be of prime importance to a study such as this, was not included.

Studies of the therapeutic efficiency of deprivation techniques cannot be expected to produce definitive results unless control groups are included in the design. In reviewing published drug trials Foulds (7) revealed that therapeutic success was claimed in 85 per cent. of studies not using control groups but in only 25 per cent. of those using control groups.

III—Discussion

It would appear, from the above, that much work has been done, and comparatively little achieved. The fact of the existence of three separate

deprivation techniques suggests that the aim is to produce deprivation effects at all costs rather than to investigate systematically the conditions under which deprivation effects appear, and those under which they disappear. It is perhaps worth noting that the excellent work of Vernon derived from the "accidental" finding that his subjects did not show the deprivation effects which had previously been produced by Bexton, Heron and Scott earlier.

Before the results of deprivation experiments can profitably be used either to throw light in normal brain function or abnormal mental states it would appear to be vital to investigate systematically and scientifically, the variables relevant to deprivation effects. These variables are both numerous and diverse, and, in the hope that future research may benefit, some of them can be listed as follows:

(i) *The Selection of Subjects*

Whether subjects are normal or abnormal, whether male or female, whether young or old and whether volunteers or conscripts and so on are variables which cannot be overlooked. Although the effects of these variables may be only slight in some cases, it is not possible to ignore them as if they had no relevance. We have already noted Petrie's prediction of a sex difference, and no doubt many more differences will eventually come to light. Also stemming from Petrie's work is the suggestion that extraverts will tolerate deprivation less and be more disturbed by it than will introverts. Whether the effects so far reported will apply to other subjects whose motivation may differ has yet to be demonstrated.

(ii) *Pre-Deprivation Experience*

The subjects having been selected, what precisely are they told, or, what are they told before they volunteer? Do the subjects know why they are doing it, are they to be paid by the hour, do they know how long they will be in the apparatus, can they terminate the experience at will and so on. Experimenters cannot be blamed for briefing their subjects beforehand, nor can they be excused for presuming that how much their subjects are told will have little effect upon the results produced. It has become commonplace to relate experimental work of this kind to the experience of shipwrecked mariners, or Arctic explorers, but there is surely an enormous difference between being shipwrecked in the Atlantic with little hope of survival and volunteering for an experiment in a research institute.

(iii) *The Deprivation Experience*

Here the possibly relevant variables are innumerable.

(*a*) The type of deprivation experience. We have already noted three. No doubt more will follow. It should not be too difficult to work in terms of the senses which are to be manipulated and the amount of manipulation of each. We noted earlier the probable relation between amount of visual stimulation and presence or absence of visual hallucinations. The same could also apply to hallucinations in the other sense modalities.

(*b*) The duration of the experience has already been shown to be important in the production of visual hallucinations. It has also been shown not to be related to the degree of intellectual impairment. This variable would appear to require intensive investigation.

(*c*) It would appear to be likely that a terminable deprivation experience will produce effects differing from one which is not terminated at will. It is not impossible in this connection that panic attacks for example will be less frequently seen when the subject cannot escape the situation. Although this variable will create enormous difficulties for the investigator, its effects must be known.

(*d*) Many experiments permit short periods of thirty minutes or so every few hours so that the subject can attend to feeding and toilet needs, while in others the deprivation experience is continuous. There is no study reported so far in which the continuity-discontinuity of the deprivation experience has been adequately assessed. Testing during isolation, important as it is, also has the effect of rendering the experience discontinuous.

(*e*) Of tremendous potential importance is the accessibility of the experimenter during the subject's isolation. It must surely matter, as Shurley's subject remarked, to know that the experimenter is actively observing the subject throughout the experiment.

(iv) *Post-Deprivation*

All effects or findings in the post-deprivation period must be related to the length of this period. It is astonishing how few experimenters report at what time since the termination of the experience the tests were given. As most effects clear up within a few hours it is hardly sufficient to say that such and such tests were given after the subject came out. Of some importance here is the environment to which the subject returns. It is rare for this to be reported at all.

In general, the time would appear to have come when it is no longer necessary to devise new deprivation techniques, to subject people to them and to write up what they say afterwards. Such preliminary work must give way to systematic research designed to investigate specific problems which have already been thrown up. Until these problems are solved it is extremely unlikely that a satisfactory explanation of the phenomena will appear.

One important omission in all this work has been the failure to distinguish between *sensory* and *social* deprivation, deprivation of the sensory type has usually included social deprivation as well. As has been seen in Solomon's review, social isolation *per se* is capable of producing devastating effects such as hallucinations, delusions, depression, and anxiety. Freedman (8) goes as far as to suggest that in sensory deprivation experiments, hallucinations, delusions, depersonalization, and changes in body image are the results of social rather than sensory isolation, the latter being responsible for visual and perceptual effects. This distinction is clearly an important one requiring much further work, and may have particular relevance to psychiatry where social isolation can be expected to play some part in the development of mental illness.

Another important omission is the failure to distinguish between the effects of *sensory* deprivation and those resulting from *sleep* deprivation. What is perhaps worse is that the majority of investigators fail even to make reference in their reports to the question whether their subjects were awake or asleep during their continued deprivation. In view of the impaired performance of subjects who experience sleep loss (Williams *et al.* (28)) this distinction may be an important one.

A third major omission has been the failure to give adequate accounts of dietary factors. It seems not unreasonable to suggest that certain vitamin deficiencies, if present, could have been in part responsible for the perceptual disturbances reported.

IV—Theories

In spite of the comparative paucity of systematic investigation into sensory deprivation, some theorists have already attempted explanatory reports of the results of these investigations. Three main kinds of theory have been put forward.

(i) *Psychological*

Utilizing the tripartite division of psychology into cognitive, affective, and conative, Freedman (8) postulates a conative theory to account for the perceptual effects of sensory isolation. He states, "The organism strives or seeks continuously and automatically to find ordered relationships in the perceptual environment. When, in the experiment on sensory deprivation, the subject is presented with a disordered perceptual environment, his previously acquired spatial schema becomes useless. What is worse, it becomes impossible to modify the old schema, or to develop a new one since he cannot extract from the stimulus field the amount of information required to maintain any spatial schema at all. . . . We would postulate that it is this process of seeking orderly relationships when there are none, and of unconsciously striving to incorporate non-order into previously existing schemata which degrades the perceptual frame of reference . . . With the breakdown of the internalized frame of reference, it becomes increasingly more difficult to structure the environment, to impose constances and stabilities on the perceived visual world. As a result, contours fluctuate, objects seem to change their size and shape, subjective colours appear, and walls bulge in and out."

Vernon, attempting to explain his finding that his sensory deprived subjects showed a significant lowering of pain threshold, and linking this finding with that of Doane *et al.* who showed a significant lowering of the two-point limen and an increase in visual acuity after sensory deprivation, suggested that such increased sensitivity may be due to a contrast phenomenon produced by sensory deprivation. He also attempts a neurological explanation which we shall meet later.

(ii) *Psychiatric*

J. C. Lilly, in his report on the mental effects of reduction of physical stimuli on healthy human beings (13) suggests that under these conditions "the mind turns inward and projects outward its own contents and processes; the brain not only stays active despite the lowered levels of input and output, but accumulates surplus energy to extreme degrees. In terms of libido theory, the total *amount* of libido increases with time of deprivation. . . . If body-libido is not discharged somatically, discharge starts through fantasy; but apparently this is neither an adequate mode nor can it achieve an adequate rate of discharge in the presence of the rapidly rising level. At some point a new threshold appears for more definite phenomena of regression: hallucinations, delusions, oceanic bliss, etc. At this stage, given any opportunities for action or stimulation by external reality, the healthy ego seizes them and re-establishes more secondary process. Lacking such opportunities for a long enough interval of time, reorganization takes place, how reversibly and how permanently we do not yet know."

Lilly makes no suggestion as to how his theory can be tested empirically, nor is it easy to see how this could, in fact, be done. Further work will determine to what extent this conclusion is justified.

(iii) *Neurological*

There is no shortage of neurological explanations of sensory deprivation. Such explanations can be regarded as taking the psychiatric and psychological types of explanation back one step further by making use of the physiological and neurological properties of the central nervous system itself. In this sense, theories of this type are more fundamental than the other two. The problem remains, however, that psychiatrists and psychologists are at best only partially qualified to put forward such theories, or indeed to criticize them. These theories, at least, have the property of lending themselves to experimental verification.

Doane *et al.* (5), attempting to explain the perceptual dysfunction following sensory deprivation, hazard the guess that the functional de-afferentation of the isolation conditions may cause parts of the central nervous system to become hyperexcitable. They add that "the lack of varied input results in an inactivity of pathways at some higher levels of the central nervous system. If these pathways consequently become sensitized, it might account for increased figural after-effect, autokinetic movement, colour adaptation and so on. It would also fit in with the least expected feature of the present experiment, the apparent increase in sensory acuity, visual and somaesthetic. . . . Finally it is easy to see how hyperexcitability of parts of the visual system might be related to the occurrence of hallucinations."

Scott *et al.* (19) in their investigation of the cognitive effects of perceptual isolation attributed their results to "some general disorganization of brain function which is also involved in the hallucinatory activity, disturbances of visual function and abnormal EEGs" which occur under deprivation conditions.

Vernon's alternative explanation of the lowering of the pain thresholds he found in his subjects is formulated in terms of the action of the reticular formation of the brain stem. "Under normal circumstances neural inputs from sensory departments can be blocked or partially inhibited at the level of the reticular formation. The blocking is produced in the descending tracts under cortical excitation aroused by any sensory stimulation. Thus it may be that sensory deprivation, by drastically reducing the amount of sensory input, minimizes the activity in the descending tracts of the reticular formation. If there is less inhibition to overcome at that level, then perhaps sensitivity is accordingly increased. In the case of pain, the neural impulses resulting from the pain stimuli would encounter less opposition and would register at a lower level of intensity."

Held (12), attempting to explain the perceptual effects of sensory deprivation, suggests that "there is ample evidence that some neurons fire spontaneously in the absence of their triggering energy and that members of a group of such neurons will fire in a non-synchronized or random manner. In the absence of systematic external stimuli, an "alert" sensory-neural system may be dominated by such internally generated noise (the word *noise* is used in analogy to acoustic noise—sound having energy distribution over a large range of audible frequencies). Noise—and this is the core of the assumption—may constitute a source of ambiguities of the type our experiment imposed upon the visual-motor system by external means. . . . With the aid of this assumption we can predict that the mere absence of orderly visual stimulation can degrade visual-motor co-ordination. The apparently innocuous condition of deprivation is really lethal because it allows intrinsic disorder to disrupt the internal state or schema that is responsible for ordered co-ordination."

Teuber (22) in elaborating notes for a neurological theory of the perceptual

effects of sensory deprivation is inclined "to see this mechanism in the central activities by which incoming sensory signals are adjusted to emerging efferent activity. The decay in perceptual constancies during deprivation, I should think, is due to the free-wheeling of some active process, rather than to mere effects of some internal 'biological noise'." He adds that in their present form these notes are inadequate as an acceptable neurological theory of sensory deprivation although they do give some idea of the form such a theory would take.

We would conclude with Hebb (11) that a number of useful theoretical ideas have been put forward but that we are still in search of a theory of sensory deprivation. As was suggested earlier, it may well be the case that there are insufficient facts about the consequences of sensory deprivation. Any theory based upon insufficient data cannot be expected to stand the test of time without some degree of modification. Theories do, however, serve one useful purpose—that of facilitating systematic enquiry.

V—The Uses of Sensory Deprivation Research

(i) *Psychological*

Psychologists have made great use of the work on sensory deprivation by considering it in relation to the development and maintenance of perception.

With regard to the maintenance of perception, Held (12) points out that the degrading perceptual and co-ordination effects of sensory deprivation are similar to those following the technique of re-arrangement—the procedure associated with Stratton's experiment in which retinal images are inverted. Both techniques demonstrate the importance of exposure history in spatial co-ordination and perception and Held suggests a common neurological process to account for them.

Teuber (22) argues convincingly that the technique of sensory deprivation produces results in the field of perception which are concordant with the results produced by the other techniques of recombination and defect. Sensory deprivation is thus an important technique in the study of perception.

Riesen's work on the development of perception using sensory deprivation techniques on animal subjects led him to carry out two experiments, one with a monkey which was deprived of visual stimulation from the age of five to ten months, the other with a chimpanzee deprived of patterned light from ten to eighteen months of age (18). The effects of such deprivations were the inability to recognize familiar objects, inaccuracies of distance and direction, and some peculiarities of eye movements and binocular co-ordinations. Riesen compared these inco-ordinations with those seen in animals deprived from birth, although in the case of the latter the development of co-ordination took much longer.

It is clear that the sensory deprivation technique is a great asset to workers in the perceptual field. It should be noted that long before sensory deprivation technique became fashionable, it was being used as a standard technique in the study of perception. In fact it was the earlier work of Hebb and his associates at McGill University, in which the effects of early sensory deprivation on animals was under study, which gave rise to the concept of sensory deprivation in its popularized form.

Related to the usefulness of the sensory deprivation technique for students of perception is its usefulness for students of cognitive development. Hebb's work on animals suggested that an impoverished and homogeneous environment produced an adult organism with poor ability to discriminate, less tendency

to explore the environments, and with diminished problem solving ability. Similar conclusions were drawn by Clarke and Clarke (4).

(ii) *Psychiatric*

Psychiatrists have, in the main, concentrated upon the similarities between the effects of sensory deprivation on normal human beings, and those of psychiatric illness which have much in common—hallucinations, delusions, perceptual disturbances and so on. They have also noted the similarity between the effects of deprivation and those of the hallucinogenic drug preparations. Although such considerations may lead to a better understanding of mental illness it should be realized that these similar effects may have entirely different causes, and, therefore, that any comparisons must proceed with caution.

Sensory deprivation, as we saw earlier, has been used therapeutically with some apparent success. In all these studies, however, control groups were lacking and conclusions must therefore be treated with care. Above all there is still the need for an adequate rationale behind the application of deprivation techniques in a therapeutic setting.

(iii) *Miscellaneous*

The value of sensory deprivation techniques in relation to brain washing has been pointed out by Solomon *et al.* (21). It should be noted in this connection that social isolation plays at least as great a part as does sensory isolation. As we saw earlier, until the effects of these two phenomena have been separated, a clear understanding of the role of sensory deprivation *per se* cannot be achieved.

Sensory deprivation techniques may also throw light on the psychological effects of space flight. Here again, we would hold that some important aspects of sensory deprivation phenomena have not yet been worked out, in particular the motivation of the subjects in relation to the type of task they are undertaking. Individual differences in deprivation tolerance will also have to be taken into account, and further work along the lines of Petrie's investigations can be expected to yield valuable results.

VI—Summary and Conclusions

The literature on the production, the effects, the explanations, and the uses of sensory deprivation techniques has been reviewed.

Attention has been drawn to the lack of adequate rationale for the existence of the three main techniques, and to the shortcomings of the experimental investigations into the effects of deprivation. The paucity of factual data gives rise to a variety of theories to explain these effects. In the absence of more data it is impossible to decide between these theories. The results of deprivation studies will continue to have limited practical application until the field is more systematically investigated.

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RELATIONSHIP OF BODY IMAGE TO SOCIAL DESIRABILITY

By

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and

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RECENT research has suggested that the social desirability factor may be considered both as a response set, which exerts a contaminating influence on personality tests (Edwards, 1957), and as a measure of pathology. With respect to the latter, Tolor and Boitano (1960) found that increased severity of psychopathology tends to be associated with a decreased ability to make socially acceptable choices on a check list consisting of an equal number of socially approved and socially disapproved items. Moreover, Fordyce (1956) pointed out that the "psychotic factor" resembles a definition of social undesirability. The present study represented an attempt to focus attention on the possible meaning of differences in social desirability in terms of differences in degree of ego-strengths of subjects. The purpose, therefore, was to determine the relationship between one aspect of ego strength, namely, the body image as reflected in the figure drawings, and the social desirability variable, as measured by a check list.

These considerations resulted in the following hypotheses which guided this research: (*a*) patients with higher social desirability scores will exhibit less body image disturbance than patients who have lower social desirability scores; (*b*) when two groups of subjects, equated for initial social desirability level, are compared on ability to change in the direction of increased social desirability, given appropriate instructions, the subjects with the greatest ability to assume a socially acceptable role will also evidence the least degree of body image disturbance; and (*c*) the proportion of negative items assigned to the concept *Mother* as compared to the concept *Father* will be greater for subjects having a more severe body image disturbance than those with a lesser degree of such disturbance. The third hypothesis was derived from Winder (1960) who summarized recent studies suggesting that patients whose pre-morbid adjustment is poorer differ from patients whose pre-morbid adjustment is better in number of negative adjectives assigned to each parent, with poor pre-morbid adjustment being associated with the tendency to ascribe more negative terms to the mother and better pre-morbid adjustment being associated with a more negative characterization of the father. The question that was raised was whether any consistent differences in response to each parent existed that could be related to the degree of body concept disturbance.

The subjects were 70 psychiatric patients who completed the Social Desirability Test devised by Tolor and Boitano (1960) and who produced two figure drawings. The human figure drawings were independently scored by two psychologists both globally, using a five-point rating scale, and in terms of individual body image disturbance indicators, following Fisher (1959). Inter-rater reliability was satisfactory, using both the global method and the sign

approach. The two measures of figure drawing disturbance correlated ·61 but were used separately to test the hypotheses.

The results show no significant group differences in the pre- or post-experimental social desirability scores nor in the amount of social desirability change for the subjects dichotomized according to their figure drawing pathology. Moreover, there was no support for the third hypothesis which predicted a relationship between body image disturbance and differences in socially undesirable characteristics attributed to each parent.

The possible effects on results of the relatively restricted range of pathology represented in this sample, and the possibility that ego strength may not be a unitary concept, measurable by a single technique, are important conditions. Assuming that the figure drawing technique represents a valid measure of body image disturbance, and that the Social Desirability Check List is an adequate measure of tendency toward social conformity, it would appear that the two are unrelated for hospitalized psychiatric patients.

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THE SHORT-TERM STORAGE OF AUDITORY AND VISUAL TWO-CHANNEL DIGITS BY ELDERLY PATIENTS WITH MEMORY DISORDER

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THE investigation to be reported in this paper was conducted with two principal aims in view. Firstly, it was desired to confirm evidence that memory disorder in elderly psychiatric patients may be due to a breakdown of processes underlying short-term retention (Inglis, 1960; Inglis and Sanderson, 1961). Such previous evidence supported the notion that memory disorder may in fact result from a disturbance of one of the mechanisms adduced by Broadbent (1957) to account for the ability of young normal adults to respond sequentially to information simultaneously presented through different sensory channels (e.g. both ears at once). Secondly, it was desired to extend the study of these retention processes in such patients to the case in which the channels for the simultaneous presentation of digits comprise two different sensory modalities (i.e. eye and ear together).

It is, by now, quite evident that the commonly used digit-span test (Wechsler, 1944) does not involve those processes of memory which are affected by ageing, either normal (Bromley, 1958) or pathological (Inglis, 1957). It is, indeed, possible that such digit-span items undergo direct transmission from receptor to effector processes, without involving the kind of storage mechanisms which seem to become less efficient with increasing age (Welford, 1960).

Broadbent (1958) has suggested that the sequential recall of sets of digits when they have been presented as simultaneous half-sets through different sensory channels, does, on the other hand, require the participation of some short-term store. In one experiment for example (Broadbent, 1957), showed that when digit-span stimuli were relayed to young normal subjects at a speed of 2 per second through headphones, one half of the span to the left ear and, at the same time, the other half of the span to the right ear, then these digits were, in fact, reproduced sequentially, without the intrusion of any of the items from one half-span into the other. Under these conditions the half-span recalled second usually contained more errors than the one recalled first.

These facts led Broadbent to suggest that two kinds of mechanisms may be involved in digit-span performance. There is, first, a "p-system", which can only pass information successively; second, there is an "s-system", which can store excess information such as may arrive, for example, when the former stage is already fully occupied in dealing with information from another channel. It is possible (Broadbent, 1957) that the p-mechanism alone is involved in orthodox digit-span performance, the s-system coming to be involved, for example, under conditions of dichotic stimulation.

A study was conducted by Inglis and Sanderson (1961) to test the notion that clinically ascertained memory-disorder in elderly patients might be related

to a breakdown of this short-term storage mechanism. The results obtained from a study of the efficiency of recall of dichotic digits in 15 patients with memory-disorder as compared with a control group of 15 elderly patients without memory disorder, confirmed this hypothesis; the former having poorer recall for that part of the span which had to be held in store for a few seconds. It seemed desirable to try to repeat this finding using different groups of similar patients.

The notion that there is a short-term storage process which deals with excess information under conditions of simultaneous stimulation, so permitting sequential recall, proved, at least in young, normal adults, not to be restricted in its application to the case where the two sensory channels lie within one modality. In another experiment Broadbent (1956) presented the half-spans of digits simultaneously to eye and ear, with similar results, showing that these phenomena are not peculiar to hearing but may be generalized to different senses. It would be of interest to discover if the kind of breakdown of storage that is shown by memory-disordered patients within one sense modality in the double stimulation situation might also appear when two different senses are involved.

Method

Subjects

The experimental group comprised 15 elderly patients who were said to be suffering from gross memory disorder. In each case a complaint about the patient's memory had been made by the doctor in charge of the case and/or the ward staff. A control group of 15 patients without memory disorder was also tested. None of these patients had taken part in any previous psychological investigation; all were psychiatric patients of the Ontario Hospital, Kingston, Ontario.

The age range of the experimental group was from 65 to 89; that of the control group was 64 to 83. The Wechsler (1955) Verbal Scale I.Q. range in the experimental group was 82 to 106; in the control group the range was from 83 to 111. There were 9 women and 6 men in the first group and 8 women and 7 men in the second.

All of these patients were co-operative during testing and none of them suffered from any sensory or motor defect so severe as to interfere with test performance. The experimental group was mainly composed of patients said to be suffering from senile dementia and cerebral arteriosclerosis, usually having been admitted to hospital for difficulties associated with failing memory. The control group was principally composed of functionally disordered patients diagnosed as cases of depression and paranoid schizophrenia.

Tests. Wechsler Adult Intelligence Scale

The WAIS (Wechsler, 1955) was used for matching the two groups in terms of both verbal ability (Verbal I.Q.) and average digit-span forward performance. The results of the WAIS were also expected to confirm a discrepancy which had previously been found on a number of occasions between the Verbal and Performance Scales for a memory-disordered group (Inglis, 1957; Inglis, 1959a; Inglis and Sanderson, 1961).

Paired Associate Learning Test

A paired-associate learning test which had previously been shown to discriminate well between elderly patients with and without memory disorder

(Inglis, 1959b) was used. A high score on this test reflects poor performance, since it indicates that many acquisition trials have been required to learn the task to the set criterion of three consecutive correct associations.

Binaural Stimulation

The apparatus used to administer the binaural stimuli consisted of a Webcor stereophonic tape-recorder (Model EP2821-5B) played into a pair of Edison (Model 30) earphones. Different sets of digits were recorded on each channel as shown in Table I.

TABLE I

Digits Used for Binaural Stimulation

	Channel 1	Channel 2
Practice series	7	Blank
	Blank	4
	7	4
Test series	5	1
	8	6
	6	3
	4	7
	21	83
	97	54
	26	38
	46	75
	547	396
	321	758
	469	132
	658	243
	5124	9836
	3752	1486
	1298	7364
	8316	5249

These digits were presented at the rate of 1 per second.

The following instructions were given to each subject. Firstly he was told, "You are going to hear a number. Tell me what you hear." The spoken digit 7 was then played on Channel 1. If the subject reproduced it correctly then the same procedure was repeated for the digit 4 on Channel 2. If the subject failed to respond or gave the wrong number the volume was increased until the correct response was made.

Secondly he was told, "Now you are going to hear two numbers together, one in each ear. Tell me what you hear." The spoken digits 7 and 4 were then played simultaneously. If the subject reproduced them correctly (in either order 7–4 or 4–7) then E went on to the test series; if not this item was repeated once more.

These procedures served as a kind of practice series to ensure that any differences later found between the groups could not be due, for example, to differences in sensory acuity.

Thirdly, each subject was told, "Now you are going to hear n numbers, n/2 in each ear." (Where n was 2 or 4 or 6 or 8.) "Tell me what numbers you hear." These instructions were repeated at the beginning of each series of a new length.

This test was scored in the following way. The first correct digit reproduced in each series determined which channel was taken to be the dominant one for

that item for that subject, the second half-span reproduced being called non-dominant. The score obtained was the average number of correct responses for each half digit-set, taking each digit's position in the half-span into account.

Audio-visual Stimulation

In order to test the notion that a breakdown in storage might also appear in a cross-modality situation, material was prepared so as to involve eye and ear at the same time.

The auditory digits were again presented from the tape-recorder, through earphones. For this series the same half-sets of digits were presented to *both* ears at once, the other half-set being in each case presented visually.

The visual digits were presented by means of a rather primitive, hand-operated tachistoscope. The digits here took the form of figures $\frac{3}{4}$-inch high, stencilled in Indian ink on a roll of paper tape. This roll of tape was mounted in a wooden box in the front of which was a $1\frac{1}{2}$ inch $\times 3$ inch slot through which the numbers could be seen. The roll was moved and the numbers changed by means of a ratchet-and-lever device. A sliding door over the front slot was so arranged that it was open and hence one digit visible only when the lever was in the down position; the exposure time was thus hand-controlled. The two sets of stimuli were synchronized by the experimenter who monitored the auditory digits over an extra pair of earphones. The digits were again presented one at a time at the rate of 1 per second, each visual stimulus being exposed for about three-fifths of a second. The subjects sat at a distance of 2 feet from the visual apparatus, the opening being at eye-level. None of them had any difficulty in identifying the numbers. New series of digits of the kind shown in Table I were used.

The instructions given to the subjects paralleled those for the binaural situation. The only modifications were those necessary to draw attention to stimuli in the two sense modalities.

The first correct digit reproduced again determined the dominance of the channels. In this situation, however, modality had also to be taken into account. Thus, one subject might first reproduce the half-set of digits delivered to him visually, recalling the auditory half-set second; another subject might reverse this order; both might maintain throughout the order they used initially, others might vary it from time to time. Because of such variation each subject could make four possible scores for each series of digits of a given length (i.e., auditory dominant and visual non-dominant, or visual dominant and auditory non-dominant). The score obtained for each of these was again the average number of correct responses for each half digit-set, taking each digit's position in the half-span into account.

Results and Discussion

The results obtained may be resumed in terms of the two main aims of the study.

Confirmation of Previous Findings

It was desired to see if a previously found discrepancy between the Verbal and Performance Scales on the WAIS in the case of memory-disordered groups (Inglis, 1957; Inglis, 1959a; Inglis and Sanderson, 1961) would be repeated. The means, standard deviations and the significance of the differences between

the means of the experimental and control groups in age, WAIS scales and the paired associate learning test are shown in Table II.

TABLE II

Means, Standard Deviations, and the Significance of the Differences Between the Means of the Criterion Groups on the Cognitive Tasks

Variables	Experimental Group (N=15)		Control Group (N=15)		Between Group Differences	
	$\bar{m}$	δ	$\bar{m}$	δ	t	p
Age	78·27	7·31	74·13	5·79	1·718	NS
WAIS I.Q.'s:						
Verbal Scale	95·07	7·78	97·00	7·60	0·685	NS
Performance Scale	80·47	8·80	91·87	6·00	4·135	$<$·01
Verbal minus Performance Scale	14·60	7·54	5·13	7·14	3·524	$<$·01
Full Scale	88·07	7·74	94·40	6·15	2·474	$<$·02
Digit span forward ..	5·20	0·68	6·00	1·41	1·970	NS
Paired associate Learning	87·87	9·98	25·80	13·55	14·246	$<$·001

Previous findings are confirmed in that the expected discrepancy between the Wechsler Scales appears even although the groups were initially matched in terms of Verbal I.Q. As anticipated, the groups are also significantly different in their acquisition scores on the paired associate learning test. They were, of course, matched for orthodox digit-span ability.

So far as the binaural stimulation part of the experiment is concerned the results (see Table III) very strongly confirm and support the findings of the

TABLE III

Means, Standard Deviations and the Significance of the Differences Between the Means of the Criterion Groups on the Binaural Stimulation Items

No. Digits	Recall Channel	Experimental Group (N=15)		Control Group (N=15)		Between Group Differences	
		$\bar{m}$	δ	$\bar{m}$	δ	t	p
1	Dominant	0·97	0·13	1·00	0·00	0·309	NS
	Non-dominant ..	0·10	0·27	0·80	0·29	7·000	$<$·01
2	Dominant	1·42	0·40	1·60	0·40	1·269	NS
	Non-dominant ..	0·22	0·31	0·77	0·57	3·274	$<$·01
3	Dominant	2·25	0·53	2·35	0·65	0·461	NS
	Non-dominant ..	0·05	0·20	1·53	0·60	9·211	$<$·01
4	Dominant	1·88	0·87	2·85	0·67	3·417	$<$·01
	Non-dominant ..	0·02	0·06	0·83	0·73	4·295	$<$·01

previous experiment (Inglis and Sanderson, 1961). When there were from 1 to 3 digits per half-set presented at the same time to each ear, the two groups did not differ in the number recalled in the dominant set but did differ markedly and significantly in the predicted direction in their recall of the non-dominant

items. When 4 digits were presented to each ear the groups differed in both their dominant and non-dominant recall; this had also been found for both 3 and 4 digits in the previous study. There may, in fact, be a critical period for both channels beyond which a kind of storage may come to be involved, which, by hypothesis, is defective in the memory-disordered, so causing differences in recall to appear even in material in the dominant channel.

These results serve to reinforce the suggestion, that defects in that kind of storage system which has been adduced to explain successive responses to simultaneous stimulation may play an important part in disorders of memory in the elderly. It remains to be seen whether this notion is supported by cross-modality data.

Extension of Previous Findings

When the means, standard deviations and significance of the differences between the means of the criterion groups on the audio-visual items are compared the results are not so clear-cut as were those for dichotic stimulation. In each case where the auditory modality was used as the dominant channel by the subject (and hence the visual channel, by definition, was non-dominant) it can be seen from Table IV that the results parallel, quite exactly. the findings

TABLE IV

Means, Standard Deviations and the Significance of the Differences Between the Means of the Criterion Groups on the Audio-Visual Stimulation Items—Auditory Channel Dominant

Recall		Experimental Group			Control Group			Between Group Differences	
No. Digits	Sense Channel	N	$\bar{m}$	δ	N	$\bar{m}$	δ	t	p
1	Auditory dominant	11	0·87	0·29	14	1·00	0·00	1·697	NS
	Visual non-dominant	11	0·24	0·42	14	0·96	0·09	6·215	$<$·01
2	Auditory dominant	14	1·55	0·48	14	1·83	0·32	1·768	NS
	Visual non-dominant	14	0·79	0·87	14	1·63	0·36	3·347	$<$·01
3	Auditory dominant	11	2·14	1·03	15	2·62	0·78	1·351	NS
	Visual non-dominant	11	0·25	0·34	15	2·37	0·78	8·367	$<$·01
4	Auditory dominant	13	1·99	1·24	15	3·53	0·90	3·789	$<$·01
	Visual non-dominant	13	0·30	0·57	15	2·08	1·17	4·994	$<$·01

of the binaural experiment. These results then, are completely in accord with expectation. Thus in the recall of from 1 to 3 digits simultaneously presented to eye and ear a non-dominant recall deficit is shown by the memory disordered group, without significant differences between the groups in the dominant channel. In the case where 4 digits were delivered to each channel, a significant difference appears in the recall of material from both channels, just as in the binaural situation.

Where, however, the visual channel was used as the dominant one (and where, again by definition, the auditory channel was non-dominant) there were, as can be seen from Table V, no significant differences between the groups. In every case, however, the difference between the groups for recall of material from the non-dominant channel was in the expected direction.

TABLE V

Means, Standard Deviations and the Significance of the Differences Between the Means of the Criterion Groups on the Audio-Visual Stimulation Items—Visual Channel Dominant

No. Digits	Recall Sense Channel	Experimental Group N	$\bar{m}$	δ	Control Group N	$\bar{m}$	δ	Between Group Differences t	p
1	Visual dominant ..	15	0·89	0·95	9	1·00	0·00	1·110	NS
	Auditory non-dominant	15	0·36	0·41	9	0·48	0·50	0·674	NS
2	Visual dominant ..	13	1·77	0·44	8	1·88	0·24	0·665	NS
	Auditory non-dominant	13	0·66	0·88	8	1·28	0·86	1·605	NS
3	Visual dominant ..	10	2·28	1·12	5	2·08	1·42	0·278	NS
	Auditory non-dominant	10	0·17	0·36	5	1·08	1·42	2·042	NS
4	Visual dominant ..	12	1·65	1·59	1	3·67	0·00	1·223	NS
	Auditory non-dominant	12	0·17	0·57	1	1·00	0·00	1·395	NS

One possible reason for the failure to find the anticipated significant differences in this case might be as follows. There were, as described, 4 series of items (i.e. from 1 to 4 digits delivered through each channel) and each one of these itself comprised 4 trials. Since there were 15 subjects in each group this meant that there were $4\times4\times15=240$ occasions on which either the visual or auditory channel could be taken as the dominant one (and, hence, the other regarded as non-dominant). The members of the experimental group adopted one or other channel indifferently as the dominant one. Out of their 240 trials, material from the auditory channel was recalled first on 122 occasions and from the visual on 118 occasions. The recall behaviour of the central group was in marked contrast to this. On no fewer than 199 occasions the auditory channel was the dominant one, the visual channel being taken as dominant on only 41 occasions. This fact is partly reflected in Table V in the columns headed N. Whereas for the experimental group the number of persons showing eye or ear dominance is about the same, there are far fewer in the control group who show eye-dominant as compared to ear-dominant responses. This, of course, only partly reflects the differential choice-rate since account must also be taken of the number of trials within each series upon which each individual exercised his "choice".

It seems possible, then, that the failure of the groups to show significant differences in the case where the auditory material was recalled second might be due to the small number of individuals in the control group who ever used the ear as the non-dominant channel, thus reducing the reliability of these results.

It is possible that if the choice of channel as dominant or non-dominant were forced upon the groups by previous instructions so that the number within each group for each kind of choice were the same, then this apparent discrepancy might vanish. An experiment along these lines is currently being conducted.

SUMMARY

This study was designed to confirm that elderly patients clinically judged to be suffering from memory disorder show a difficulty in the sequential reproduction of simultaneous stimuli when these take the form of dichotic digits. It

was also desired to see if they show a similar impairment in recall when the channels of simultaneous stimulation comprise different sense modalities.

Two groups of 15 elderly psychiatric patients, one group of patients with memory disorder and one group without, were tested. The results obtained in general confirmed expectations.

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ADMISSIONS AND READMISSIONS TO THREE LONDON MENTAL HOSPITALS

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Introduction

In discussing current trends in mental hospital statistics, it is convenient to make a distinction between patients who have been resident for more than two years (the longstay group) and short or medium stay patients. The chances of discharge, once an individual has been resident for two years, are low and become progressively lower the longer he stays. In mental hospitals in England and Wales from 70 to 80 per cent. of patients are longstay; and the majority of these are diagnosed as schizophrenic (75 per cent. in 1954), although no more than one-third of newly admitted patients are given this diagnosis. There has been a consistent tendency over the past 30 years for a decreasing proportion of schizophrenic patients to be retained continuously for two years after admission—for example, about 60 per cent. of schizophrenics admitted in 1930 were retained in this way, compared with 30 per cent. in 1950 (Brown, 1960). Since then there have been important changes in social treatments and administrative policies, and the major tranquillizers have been introduced. The proportion of schizophrenics retained for two years or more has now approached 10 per cent. at many hospitals (Brown, 1959; Wing *et al.*, 1959). However, very little is known in numerical terms about the extent to which the patients have to be readmitted to hospital once they have been discharged. The only satisfactory studies of the readmission of schizophrenic patients were made before the introduction of the recent changes in discharge policy, and dealt with admission cohorts in which the proportion retained for two years ranged from 60 to 30 per cent. (e.g. Freyhan, 1958; Shepherd, 1957). Reduction within this range did not appear to lead to an increased risk of readmission. However, the possibility cannot be dismissed that a further reduction would lead to the discharge of patients with a special liability to relapse and readmission.

National statistics provide some indirect evidence on this point. Between 1951 and 1956 there was a 50 per cent. increase in the total number of admissions per year to hospitals in England and Wales. Different diagnostic groups contributed to this large increase in differing ways (G.R.O., 1953, 1955, 1958, 1960). For example, the large increase in the numbers of patients admitted for manic-depressive reactions had two more or less equal components—more patients were being admitted for the first time, *and* more patients were being readmitted. The figures for schizophrenia were quite different. There was little increase in the number of patients admitted for the first time (10 per cent.) but the number of previously admitted patients more than doubled between 1949 and 1956 (122 per cent.). It seems likely that the increasing number of schizophrenic readmissions

was due to progressively changing discharge policies and that a greater proportion of those discharged were being readmitted. The introduction of tranquillizing drugs in 1954–55 should be seen against the background of these long-term statistical trends.

A detailed large-scale study of these matters is difficult because of the problems of collecting and interpreting the data, while a small-scale study may not be representative of trends all over the country. We have therefore selected for study three 2,000-bed mental hospitals with adjoining catchment areas in Greater London which are known to have had markedly different admission rates and discharge policies, and which may represent different components in the national statistics. Banstead Hospital in 1956 had a total admission rate of 238 per 100,000 of the catchment area population over 15 years of age. The equivalent rates for Springfield and West Park Hospitals were 196 and 150. These rates are not age and sex specific, but they are sufficient to illustrate the large differences between hospitals. Discharge policies were equally varied, according to a number of different indices. For example, the proportion of all patients admitted in 1951 who remained in hospital for two years continuously was 20 per cent. at Banstead, 16 per cent. at Springfield and 30 per cent. at West Park. For patients admitted in 1956 the equivalent figures were 6 per cent., 12 per cent. and 17 per cent. Thus not only had the three hospitals reached different levels by 1956, according to this index, but they had been proceeding at different speeds towards them. A comparison of the extent to which patients admitted to these hospitals were subsequently readmitted after discharge might therefore be expected to throw light on the changes now taking place throughout the country. In addition, a comparison of the total hospital experience, during a given period of time, of patients admitted in 1951 with that of patients admitted in 1956 would indicate the way in which the increase in numbers of admissions, discharges and readmissions was affecting bed requirements.

We concentrated particularly on patients who were given a diagnosis of schizophrenia. All schizophrenic patients admitted to the three hospitals in 1951 and 1956 were followed up for three years in order to check on subsequent periods in hospital. In addition, a smaller follow-up study on the same lines was carried out for all other patients admitted to Springfield and West Park Hospitals in 1951 and 1956.

Method

Data were collected in three stages:

1st Stage

Information about age, sex, legal status, marital status, diagnosis, dates of key admission and discharge, previous admissions and address to which discharged were collected from G.R.O. admission cards. In the case of non-statutory patients, where cards were not completed, clinical records were consulted. Transfers from other mental hospitals were excluded. Classification of diagnoses followed that of Vera Norris (1959) with the exception that schizophrenic patients aged over 60 (6 per cent. of schizophrenic admissions) were included with senile conditions. Otherwise "schizophrenia" included paranoid psychosis, schizo-affective psychosis, paranoid state and paraphrenia.

2nd Stage

All case-notes and correspondence files of the 1,300 schizophrenic patients were studied in order to check on the accuracy of the information recorded on

the G.R.O. cards*. Random samples of the clinical notes were also examined to check whether changes in diagnostic practices had taken place between 1951 and 1956.

3rd Stage

Records of these three hospitals and eight other hospitals serving adjacent catchment areas in Greater London were systematically checked for any subsequent admissions of cohort patients in the three years following their admission. Five London hospitals without defined catchment areas and the five main observation wards were similarly checked (the latter by means of the central records of the L.C.C. Mental Health Department). Admissions to observation wards followed by transfer to mental hospitals were recorded as a single admission.

In this way it was possible to record for each patient:

1. The number of admissions to a mental hospital during the three years following admission in 1951 or 1956.
2. The time spent in hospital at each admission during the three-year period.

Results

A. Admissions to the Three Hospitals in 1951 and 1956

Four hundred and ninety-eight schizophrenic patients (41 per cent. first admissions and 59 per cent. previously admitted) entered hospital in 1951, and 802 (33 per cent. first admissions and 67 per cent. previously admitted) in 1956 —an increase of 61 per cent. Admissions of patients with affective conditions rose from 458 to 892—an increase of 95 per cent. Admissions of patients with other diagnoses rose only by 36 per cent.—from 723 to 983.

As had been expected from national data, there was a disproportionate rise in the number of schizophrenic patients who had been previously admitted (84 per cent. compared with a rise of only 29 per cent. in first admissions). For affective conditions there was a marked increase both in first admissions (78 per cent.) and in admissions of patients who had been in hospital before (117 per cent.).

The distributions of age, sex and marital status were similar in the 1951 and 1956 cohorts, except that for affective disorders more male patients were admitted in 1956 than in 1951, and also more patients over the age of 60. A special check was made, on a one-in-three sample of case-notes, to see whether the increase in the number of admissions was associated with a marked change in type or severity of illness in the patients diagnosed as schizophrenic. There was no evidence that this was so.

B. Follow-up of Schizophrenic Patients

(i) *Readmissions During Follow-up Period*

Table I shows that there was a reduction in the numbers and proportions of schizophrenic patients remaining in hospital continuously for two years or more, both for first admissions and for previously admitted patients. Thirty-one

* Eleven per cent. of cards in the 1951 cohort and 14 per cent. in 1956 received at least one correction as a result of this check. The majority concerned a change from "first" to "previously admitted" (8 per cent. and 10 per cent. in the two periods).

per cent. (139 patients) of all admissions for schizophrenia in 1951 were retained in this way compared with 13 per cent. (90 patients) in 1956.

TABLE I

Numbers of Schizophrenic Patients Admitted to Banstead, Springfield and West Park Hospitals in 1951 and 1956. Numbers Discharged within 2 Years of Admission, and Numbers Subsequently Readmitted During Follow-up Period

	(*a*) No. in Cohort	(*b*) Discharged Within 2 Years of Admission		(*c*) Readmitted During Follow-up Period	
1951		N	% of (*a*)	N	% of (*b*)
First admissions	175	124	71	50	40
Previously admitted	271	183	68	102	56
Total	446	307	69	152	50
1956					
First admissions	222	202	91	109	54
Previously admitted	493	423	86	290	69
Total	715	625	87	399	64

The proportion of patients discharged and subsequently readmitted during the follow-up period rose from 50 per cent. to 64 per cent.* Eighty-eight patients of the 1951 cohort were discharged and subsequently readmitted on one occasion during the follow-up period; 64 were readmitted twice or more. The equivalent figures for the 1956 cohort of admissions were 177 and 222, an increase of 101 per cent. and 247 per cent. respectively. On the other hand, the numbers of patients discharged and not readmitted rose only by 47 per cent. (155 to 226 patients). These changes can be summarized by calculating the number of readmission events occurring during each follow-up period: there was a threefold increase, from 248 to 765.

When the results were broken down further, it became clear that these *trends* held true for each of the hospitals taken separately, although the actual figures differed considerably.

(ii) *Length of Key Admission*

While the numbers of schizophrenic patients admitted in 1956 rose by 61 per cent. compared with 1951, there was an increase of 104 per cent. in the number leaving during the three years following admission. By far the greater part of this increase was accounted for by the trebled number discharged within four months of key admission (158 and 475). Those leaving after four months' stay increased by only 11 per cent. (204 and 228). This was true of all three hospitals taken separately.

There was an increase of 8 per cent. in the total time spent in hospital by schizophrenic patients in the 1956 cohort during the 36 months after admission, when compared with patients admitted in 1951. Since the number of patients

* In order to obtain a more accurate estimate of the proportion readmitted, the schizophrenic patients who left the London area on discharge from hospital (10 per cent. of each cohort)—one-third of them to Ireland, Scotland, or abroad—have been excluded from calculations concerning readmission. Their inclusion, however, does not affect the size of the differences between the two periods.

involved had increased, the average time spent in hospital decreased from 17·0 to 11·4 months out of 36 (47 per cent. to 32 per cent.).

(iii) *Number of Beds Occupied During Each Follow-up Period*

A simple enumeration was made of the number of schizophrenic patients admitted during 1951, who were actually in hospital on 1 January, 1953 and 1 January, 1954 (213 and 207), and similarly of those in the 1956 cohort who were resident on 1 January, 1958 and 1 January, 1959 (236 and 210). A further calculation was made to demonstrate that these figures closely approximated to the numbers of beds occupied on any given day during the second two years of the three-year follow-up period. There was very little fall-off in the bed-requirement during the two years, and very little difference between the needs of the 1951 and 1956 cohorts (just over 200 beds in each case). However, these beds were utilized in quite different ways. During 1953 and 1954, 126 beds (61 per cent.) were occupied by patients who had been in hospital continuously from the time of their admission in 1951. During 1958 and 1959, 150 beds (66 per cent.) were occupied by patients who had been admitted in 1956, discharged, and subsequently admitted again. Thus, approximately the same number of beds was made to serve a much larger number of patients by reducing the average time spent in hospital by each person and trebling the number of readmission events. This was also true at each of the three hospitals taken separately, though there was a slightly greater increase in bed-requirement at Springfield and West Park than at Banstead.

It is difficult to estimate the future fall-off in bed requirements for schizophrenic patients admitted in 1956—there was very little change between 1958 and 1959. The risk of readmission may decrease with time, and future treatments may be more effective. An increasing use of day centres may affect the position. On the other hand, there may be a tendency to retain a schizophrenic patient longer, the more often he is readmitted. There is some evidence for this in the present data. Patients in the 1956 cohort who were discharged, and subsequently readmitted and redischarged once or twice during the three-year follow-up period, were selected for special study. At each of the three hospitals the first period of readmission was longer than the key stay, and the second period of readmission was longer than the first. Thus, 170 patients were readmitted and redischarged once during the follow-up period. They stayed, on average, 18·5 weeks at the key admission, and 21·8 weeks when readmitted ($t=2·35$, $p=<·02$). Another 179 patients were readmitted and redischarged twice during the follow-up period. They stayed 11·5 weeks at the key admission, 13·1 weeks at the first readmission, and 19·4 weeks at the second readmission ($F=11·59$, $p=<·001$). These increases were also significant at each of the three hospitals taken separately.

C. Follow-up of All Patients Admitted to Springfield and West Park in 1951 and 1956

Table II presents the data concerning diagnosis, death, discharge and readmission within a three-year follow-up period for all patients admitted to Springfield and West Park Hospitals in 1951 and 1956. The numbers staying continuously for two years show no change (220 and 216), although the diagnostic composition is somewhat different in the second period, there being fewer schizophrenic patients and more with affective disorders. The numbers of patients discharged and not readmitted rose somewhat (405 to 579, or 43 per

cent.), but there was a marked increase in the numbers discharged and readmitted once (153 to 263, or 72 per cent.), and twice or more (105 to 299, or 185 per cent.). Patients with affective disorders and patients with schizophrenia contributed to this increase in readmissions in equal measure. Forty-four per cent. of patients with affective disorders who were admitted in 1956 were subsequently readmitted during the follow-up period. The equivalent figure for patients admitted in 1951 was 39 per cent. Thus the prognosis was not changed in this respect. Nor was there a marked change in total length of stay between 1951 and 1956 (9·6 months and 7·8 months). These results hold true both for first admissions and for previously admitted patients.

TABLE II

Three-year Prognosis of Patients Admitted to Springfield and West Park in 1951 and 1956 by Diagnosis

	Discharged and not Readmitted Within 3-Year Period		Readmitted During 3-Year Follow-up Period: Once		Readmitted During 3-Year Follow-up Period: Twice or More		Over Two Years' Continuous Stay		Death Within 3-Year Follow-up Period		Total	
	1951	1956	1951	1956	1951	1956	1951	1956	1951	1956	1951	1956
Schizophrenia	124	164	60	108	44	132	85	68	5	10	318	482
Affective conditions ..	134	261	53	101	34	104	28	46	12	8	261	520
Senility and organic disorders	67	75	19	19	7	20	93	96	135	182	321	392
Neurosis, etc.	80	79	21	35	20	43	14	6	4	2	139	165
Total	405	579	153	263	105	299	220	216	156	202	1,039	1,559

The average length of stay in hospital during the three years (including readmissions) decreased for all diagnoses from 13 months to 10 months. However, the total time spent in hospital increased by 18 per cent. because of the large increase in the number of patients. This was brought out more clearly by the enumeration of the number of beds occupied on given dates in the follow-up periods. One thousand and thirty-nine patients were admitted to the two hospitals in 1951: 325 of these were in-patients on 1 January, 1953, and 291 on 1 January, 1954. One thousand five hundred and fifty-nine patients were admitted in 1956: 418 of these were in-patients on 1 January, 1958 and 363 on 1 January, 1959. Thus there was *an increase of about 25 per cent.* in the bed-requirements of the 1956 cohort during 1957 and 1958, compared with the requirements of the 1951 cohort during 1952 and 1953. This was largely due to patients with diagnoses other than schizophrenia. Schizophrenic patients admitted to these two hospitals contributed only about 25 per cent. of the total increase in bed-requirements.

DISCUSSION AND CONCLUSIONS

1. First admissions for affective disorders showed a marked increase from 1951 to 1956, although first admissions for schizophrenia did not. On the other hand, previously admitted patients increased markedly in both diagnostic categories. A similar trend can be seen in the national data. Thus there does not seem to be any tendency to admit, on a large scale, a new kind of schizophrenic patient (this was confirmed by the case-note analysis), and increased readmissions have probably been largely due to the effects of changing discharge practice.

New patients with affective disorders were being admitted in 1956, but their prognosis, in terms of readmission during a three-year follow-up period,

did not seem to be any different from patients first admitted with the same diagnosis in 1951. Either they had milder illnesses which were just as liable to relapse as more severe conditions, or they had severe disorders which would previously have been treated without admission to hospital. There was no change for previously admitted cases either. The large increase in numbers of admissions with affective disorders in 1956 compared with 1951 seems likely, therefore, to have been due largely to the intake of new patients, and to a lesser extent to a change in discharge practice.

2. In general, there was a decreased average length of stay (including readmissions) during a three-year follow-up period for patients admitted in 1956 compared with a 1951 cohort. This could be seen for all diagnoses. The same *number* of patients remained in hospital for two years or more but there were fewer schizophrenics among them in the second period.

3. Because of the increase in the numbers of patients admitted, and in the number of occasions on which they were subsequently readmitted, the total time spent in hospital during the three-year follow-up period by patients in the 1956 cohort was substantially greater than for patients admitted in 1951. This was reflected in the fact that about 25 per cent. more beds were needed to serve the 1956 cohort, one to three years after admission, than for the 1951 cohort.

4. The decrease in length of stay was most marked for schizophrenic patients, for whom bed-needs did not rise. However, during the second follow-up period the beds were utilized mainly for readmitted patients rather than for patients remaining continuously in hospital. There was evidence that length of stay increased significantly with frequency of readmission.

5. These results provide a rough measure of the increase in the amount of work being carried out by the hospitals. Bed needs were only prevented from rising still further by the very large increase in the turnover of patients.

6. These conclusions hold good for 3 hospitals whose catchment areas are very different in social composition, and whose admission and discharge practices have in the past been very different from each other. The age, sex and diagnostic composition of their admission is similar to the national distribution. Although we cannot be sure how far the results can be generalized, it seems reasonable to assume that similar trends may have been occurring in other large conurbations and that they may hold true nationally.

We do not feel that it is justifiable to extrapolate these overall statistical trends in order to make an estimate of future bed needs at the three hospitals. It is not clear, at the moment, how far an increasing use of day-centres, or out-patient treatment (particularly with the newer major tranquillizers and anti-depressive drugs) will affect the picture. It is possible that a changed public attitude to mental hospitals—together with the abolition of over-crowding—may result in the attraction of new kinds of patients. Day centres also may deal to some extent with additional patients who previously would not have come under psychiatric care. It is too soon to say whether the present practice of frequent readmissions for schizophrenia will be continued, or whether there will be a strengthening of the already existing tendency to retain certain patients for longer periods, as they are readmitted more often. In making an estimate of future bed needs it is necessary, at every stage of the computation, to make decisions about what the current trends are, and which of them will continue in the future. In no case is a simple factual answer possible. Consistently cautious decisions would lead to a high estimate, consistently optimistic decisions to a low one. We do not think, therefore, that a statistical forecast based on our results would be very helpful in the present rapidly changing situation.

7. This study emphasizes the need to investigate the extent of the morbidity shown by patients with multiple admissions to hospital, during their periods in the community. It may be that there are advantages and disadvantages in decreasing the length of stay to a minimum, even if later readmission is inevitable. The data on which an adequate evaluation can be based have not yet been published. Studies which assess the extent of the need for day centres, hostels, and out-patient and domiciliary supervision, and which establish how many patients in various age and diagnostic categories can benefit, are also necessary before rational planning of the mental health services can be undertaken.

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SEVERE PSYCHIATRIC DISTURBANCES IN THE POST-OPERATIVE PERIOD—A FIVE-YEAR SURVEY OF BELFAST HOSPITALS

By

S. J. KNOX

THERE are few incidents more calculated to disturb the well-ordered routine of a surgical unit than when a patient develops a severe psychiatric disorder in the post-operative period. Such episodes may occur suddenly after an interval of seemingly uneventful recovery and in some instances may be of such severity as to result in an appreciable and even dangerous deterioration in the patient's physical state. The impact on relatives must also be considered, for it is easy to understand the dismay which they must experience on observing the patient pass from a state of apparent composure into one of hyperkinetic excitement, panic, or confusion.

The first comprehensive account of the disorder is usually attributed to Dupuytren of Paris (21). In the eighth of his series of clinical lectures in surgery published during 1834 he commented, "... finally, the brain itself may be overcome by pain, terror, or even joy, and reason leaves the patient at the instant when it is most necessary to his welfare that he should remain calm and undisturbed." Having presented 7 examples of "nervous delirium" he continued, "It begins sometimes by incoherent gestures and irregular movements, but most often in a sudden and unexpected manner, in individuals often placed in the most favourable circumstances . . . individuals affected with this kind of delirium are often so utterly insensible that patients with comminuted fractures of the lower extremity have dragged off all their dressings and walked about on the broken limb, without exhibiting any signs of pain; others, whose ribs were broken, tossed themselves about and sang without seeming to feel pain; finally, it has happened that a patient who had been operated on for hernia introduced his fingers into the wound, and amused himself by unrolling his intestines, as if he were working on a dead body."

Although the post-operative psychoses have been recognized for many years, there is little agreement regarding various aspects of the problem, such as incidence, the contribution of the anaesthetic and the relative importance of the site of operation.

In this paper a re-examination of relevant studies will be undertaken, and the association with cataract extraction, gynaecological and cardiac surgery will be particularly stressed. In addition, an evaluation of the disorder as it has occurred in the Belfast Hospitals over a 5-year period from 1 January, 1956 to 31 December, 1960 will be presented.

REVIEW OF THE LITERATURE

INCIDENCE

The incidence of post-operative psychosis is generally given as 1 in 400 operations (Kelly, 38). Da Costa (16) anticipates the frequency as 1 in 250 laparotomies. Lewis (42) considers such estimates to be excessively high and he reports that in a large general hospital where there were approximately 2,000

operations yearly the incidence over a 5-year period was 1 in 1,500. During a similar period Stengel, Zeitlyn and Rayner (62) studied 80 patients who had been admitted to St. Francis Hospital Observation Ward and to the Maudsley Hospital with this diagnosis. The patients had been transferred from 35 hospitals in London and beyond and the authors suggested that the number of patients lost from their series by referral elsewhere was not significant. They did not indicate the total number of operations carried out in these hospitals during the period of study and therefore the incidence of severe post-operative psychiatric disturbance cannot be assessed. Nevertheless, from such a large catchment area, the total appears low and would seem to indicate that the disorder is comparatively uncommon. Recently Scott (58) has discussed this disorder in the aged and described 11 cases as occurring in 2,000 surgical procedures.

It is difficult to estimate retrospectively the overall incidence for a variety of reasons. The manual *International Classification of Disease* does not list post-operative psychosis as a specific entity, and the clinical picture varies so that cases may be assigned to different categories, the primary diagnosis listed as schizophrenia, depression or delirium, and a superficial statistical study of the post-operative psychoses as a group rendered extremely difficult. Furthermore, it is probable that many cases having less severe psychiatric disturbances are not referred to a psychiatrist, this largely depending on the willingness of the surgeon to deal with such problems and the capacity of the nursing staff to adapt to psychiatric nursing. Again, a psychiatrist may be asked for advice and include a brief statement in the general notes. Unless the patient is transferred to his unit no formal clinical records may be available. The type of patient generally treated in the ward may partly determine whether referral is undertaken. A mild to moderate degree of post-operative confusion may not be regarded as exceptional in an ophthalmic department where a large proportion of the patients are elderly and having cataract extraction, whereas in a general surgical ward such an episode would probably give rise to much more concern.

Site of Operation

In spite of uncertainty regarding the incidence of the disorder it has, for many years, been held that two surgical procedures, namely gynaecological operations and cataract extraction, are particularly liable to give rise to post-operative psychoses. Recently there has been an increasing awareness of the frequency with which psychiatric disturbance follows cardiac surgery.

(i) *Cataract Extraction*

The first report in English literature of psychiatric sequelae to cataract extraction was published in the *Medical Times and Gazette* in 1854. Pre-operatively a 65-year-old man with bilateral cataract was agitated to such a degree that extraction had to be postponed for 24 hours so that chloroform could be administered. During the first post-operative day "delirium set in, and continued with violence until . . ." the fifth day, when he made a satisfactory recovery.

Since then many authors have emphasized the frequency with which psychotic disturbance follows the operation and the incidence has usually been given as 2–3 per cent. (Greenwood, 31; Oltman and Friedman, 49). Brownell (10) found 30 cases of delirium in 962 instances of cataract extraction performed at the Ophthalmic Clinic of the University of Michigan between 1904 and 1917.

Preu and Guida (50) commented on the psychogenic nature of the illness though they described only 4 cases. They thought that the ageing process was to be considered only in its experiential aspect and not in the sense of senile arteriosclerotic encephalopathy. Blindfolding has been regarded as significant in precipitation of the psychiatric disturbance (Brownell, 10; Greenwood, 31; Russell, 54) and removal of the bandages leads, in many cases, to elimination of the disturbance. In such instances the success of unmasking will, of course, depend on the degree of visual impairment in the eye not operated upon. Studies of experimental sensory isolation are pertinent in this context (Heron, 35; Shurley, 60). Such investigations establish that most individuals, irrespective of age, can be profoundly affected by a restriction of stimuli received through sight, sound and touch.

Elderly persons readily become emotionally disturbed when confronted with new situations, especially if these are inadequately comprehended and associated with feelings of insecurity. It has long been appreciated that a sympathetic and understanding nursing staff can do much to support and fortify the patient during the period of blindfolding and thereby may help to relieve or prevent post-operative psychosis. Such disturbance is liable to increase in severity at night as auditory cues of day-time activity are reduced, and silence, interrupted by isolated and muffled sounds, becomes the patient's principal contact with the world he can no longer see. Misinterpretation of these stimuli may induce panic. Bruns (11) treated 272 consecutive patients having cataract extraction on an ambulatory basis. Each was returned to his home immediately after the operation and in no cases did psychosis develop. Weisman and Hackett (66) have discussed the paramount importance of establishing a strongly-supportive doctor-patient relationship in the prevention and treatment of post-operative delirium.

Linn and his co-workers (44) demonstrated the effect of masking pre-operatively. They studied 21 consecutive patients admitted for senile cataract extraction. Prior to surgery each subject was blindfolded for a period of at least 12 hours and in 10 patients the procedure was associated with disturbed behaviour. Anxiety could be relieved by removal of the mask. Post-operatively 20 patients (95 per cent.) demonstrated some alteration in behaviour including delusions, hallucinations, disorientation and confabulation.

It is evident that many cases of post-operative cataract delirium can be understood in terms of the inability of vulnerable patients to adapt to severe psychic stress in the form of anxiety-provoking surgery and temporary loss of vision in unfamiliar surroundings. It seems, therefore, that an important prophylactic measure would be to admit the patient for a sufficient period pre-operatively to permit him to become familiar with his surroundings and become acquainted with the doctors and nurses who will be responsible for his welfare. An interesting study by Wynne, Fang and Gibson (68) lends support to this. In the 10-year period 1941–1951 there were 26 cases of post-operative psychosis following cataract extraction transferred to the disturbed ward of the Psychiatric Service, Massachusetts General Hospital. Cataract extraction was performed 10 times more frequently than retinopexy. Following 1,950 retinopexies, 4 patients were noted to be psychotic but in only one instance was there the possibility that the operation had been the precipitating factor. The retinopexy group had a much greater number of eye operations previously and the time allotted for pre-operative preparation was significantly greater in this group. It was considered that this factor was most important in that the cataract patients had little or no experience of previous ophthalmic surgery. There

seemed to be no association between the exhibition of drugs such as atropine or barbiturates and the development of psychiatric disturbance.

It would appear that the loss of visual cues may be sufficient in itself to induce a psychotic reaction in a proportion of patients. In others the operation merely brings to light a dementing process which had not been recognized beforehand, and sedation with barbiturates post-operatively may serve in a number of these to heighten the confusion. A factor which also warrants consideration is that some of these patients may have been living a solitary existence and quantitative or qualitative dietary deficiency may condition them to post-operative psychiatric disorders.

(ii) *Gynaecological Surgery*

At one time genital disorders were regarded as a cause of insanity in women and accordingly gynaecological surgery was advocated as a therapeutic measure. Russell (55), in 1897, deprecating this practice commented: "The specialist in surgical gynaecology believes that insanity in women is largely, if not altogether, due to pelvic disorders, and he proceeds to restore to reason the unhappy victim by unsheathing his scalpel and removing the offending organ. He wages his most relentless fury on the ovaries, for in them he believes reside the chief demoniacal spirits that torture the unhappy lunatic.—Happy, thrice happy should man be because of the simplicity of his genital outfit, and its meagre attraction for the operation of surgical science."

Both gynaecologists and psychiatrists have remarked on the psychological implications of hysterectomy. Donovan (19) has commented "the loss of menstrual function is perceived by the woman as a blow to normal feminine self-esteem". Weiss and English (67) point out that hysterectomy means termination of child-bearing capacity and the more it antedates the menopause the greater is the likelihood of associated psychological disturbance. Even after the menopause it may lead to conscious or unconscious resentment for the operation is regarded as interfering with capacity to function sexually or to be a satisfactory sexual partner. Lindemann (43) studied 51 women by neuropsychiatric examination prior to major abdominal surgery. Post-operatively 13 patients showed restlessness, insomnia, agitation and pre-occupation with depressive thought content beginning from 3 to 4 weeks after surgery and lasting for more than 3 months. The relative frequency of this disorder was much greater after pelvic operations than cholecystectomy, and it developed more frequently in those who had a previous history of depressive episodes. No significant relationship to pre-operative anxiety, sexual maladjustment or environmental factors could be demonstrated in the group studied. Stengel and his colleagues (62) found that gynaecological procedures were highly represented in their series of post-operative psychosis, and hysterectomy comparatively more frequently than any other gynaecological operation. They proposed that reasons for this may be the psychological significance of hysterectomy, "its frequency in a vulnerable age" and the degree of the procedure itself. They were careful to point out that in such a small series as theirs the significance of this finding might be questionable and that large-scale investigation on a regional basis was required to allow of more valid conclusions. Their findings could also be explained if their series was a biased one with a disproportionately high percentage of referrals from a unit where there was interest in psychiatric response to gynaecological surgery. Kroger (41) advocates careful pre-operative evaluation of the personality needs of all patients sub-

mitted for the operation, thereby facilitating physical, sexual and social adjustment. When physical indications for the procedure are predominant the emotional disturbance may initially be overshadowed. When hysterectomy is recommended for borderline indications all patients should have pre-operative psychological appraisal. Hollender (36) found that of 203 women admitted to Syracuse Psychiatric Hospital in 1958 there were 9 in whom pelvic surgery appeared to be the precipitating event. This was regarded as in sharp contrast to the total of 5 women admitted following operations of all other kinds. Apart from two patients presenting with a clinical picture of schizophrenia all those who had pelvic operations displayed agitation and depression. It was felt that the disorder could be understood in terms of a profound psychological reaction to loss of child-bearing capacity.

As yet it cannot be stated categorically that hysterectomy *per se* carries a significantly higher incidence of severe psychiatric disturbance than does any other operation of similar magnitude in the same age group. Apart from Lindemann's report (43) there is a lamentable lack of relevant studies, and the specific emotional implications of the procedure would seem to warrant further evaluation. As such psychological reactions to hysterectomy are stressed in medical teaching and literature, often supported only by clinical impressions, the doctor may be more likely to enquire for and comment on such responses and be unaware of similar states following other operations. Again, we do not know how frequently hysterectomy, as compared to other procedures, is undertaken for predominantly emotional disturbance. In relation to this problem Gidro-Frank, Gordon and Taylor (29) have recently called attention to the significance of emotional factors in women presenting with pelvic pain. Psychiatric features, evident post-operatively, may have been present but unobserved pre-operatively, especially if the patient was in hospital for only a brief period before surgery.

(iii) *Cardiac Surgery*

Serious psychiatric disturbances have been observed to occur with considerable frequency following mitral valvotomy. Fox and his co-workers (28) interviewed pre- and post-operatively 32 patients submitted for this operation and noted that 6 (19 per cent.) had "obvious emotional disturbances" following the procedure. In addition, several other cases had less severe and more transient psychiatric sequelae. This report could be criticized in that the authors gave little information on objective measures of physical deterioration or improvement. Nevertheless, theirs was a valuable contribution, for as far as can be ascertained it was the first report on psychiatric complications in heart surgery. Bliss, Rumel and Branch (5) studied the hospital records of 37 patients who had undergone mitral surgery, and found 4 cases of post-valvotomy schizophrenic reactions; a further two patients developed confusional states. This is equivalent to approximately 16 per cent. of the total. A further six patients "although not psychotic, were sufficiently anxious and depressed to merit comments by both physicians and nurses". Bolton and Bailey (7) analysed the records of 1,500 consecutive patients who had had some type of intracardiac procedure for correction of valvular defects resulting from rheumatic fever. Even minor degrees of mental aberration were considered as post-operative psychosis. Whilst appreciating the difficulty in accurate evaluation of what constitutes abnormality it was felt that symptoms such as "euphoria, depression and mental confusion in minor degrees, as well as the usual frank psychotic mani-

festations, should be classified as such". The incidence of post-operative psychosis was 3·14 per cent. There appeared to be no relationship between the development of psychosis and sex, age, severity of heart disease, duration of failure, or complications at surgery leading to cerebral ischaemia. The one factor which seemed to influence the occurrence of psychic disturbance was the type of lesion. Cases of acquired heart disease with a "dynamically significant mitral insufficiency" were associated with a higher incidence of mental aberration than other lesions. Kaplan (37) examined 18 patients after the operation; 3 cases (17 per cent.) became psychotic and a variety of psycho-neurotic reactions occurred in others. Dencker and Sandahl (17) have noted in a brief communication that of 61 patients undergoing mitral valvotomy 3 became psychotic soon after the operation. However the frequency of major mental symptoms pre-operatively was also high, as 5 patients, including 2 of the 3 above "had had episodes of disorientation, delusions and/or hallucinations, usually with amnesia for at least a few days—in fact, organic psychoses". Another had a chronic depressive illness and repeatedly attempted suicide. The psychotic picture pre-operatively did not differ from that after surgery and it was suggested that the high incidence of severe psychiatric disturbance after surgery may not have been evident if some patients had not been psychiatrically disturbed before. Zaks (69) suggests that the disturbances may not be entirely psychogenic but that psychiatric problems in the rheumatic heart patients may be precipitated by "organic changes" in the course of the disease and valvular surgery. Priest *et al.* (51) suggest that the cardiac output may not be maintained during some intracardiac manipulations and cortical ischaemia follows.

Our knowledge of the psychiatric implications of heart surgery requires to be expanded, for here particularly is uneventful convalescence of paramount importance to the well-being of the patient.

Anaesthesia and Age

The anaesthetic is often incriminated as a direct cause of post-operative psychosis. Doyle (20) has distinguished between the post-anaesthetic and organic types of the disorder, reputed to follow immediately after the operation, and the "interval psychosis" where the onset of mental disturbance is preceded by a latent period of variable duration. Almost 40 years earlier Dent (18) had also implied such a distinction by stating, "I cannot believe that in the cases in which, as so frequently happens, complete mental recovery takes place after the anaesthetic, the mania then creeping in after this distinct and lucid interval of time, the anaesthetic has anything to do with the matter." However, it is well established that in a proportion of cases the psychiatric condition is directly or indirectly attributable to the anaesthetic. Batten and Courville (3) have issued a warning regarding nitrous oxide anaesthesia; in a survey of the literature they found 11 well-defined cases where mental disturbance followed induction with this agent, and they described a further 10 cases with which they were personally acquainted. In patients dying within a few days or weeks patchy necrosis or subtotal destruction of the cerebral cortex was found, often with necrotic change in the lenticular nuclei. Anoxaemic anoxia rather than a direct toxic effect seemed responsible. Bourne (8, 9) also has outlined some unhappy consequences of nitrous oxide administered in dental practice, even to young subjects.

It is, however, the elderly who are particularly vulnerable, as the incidence

of undesirable physical and psychiatric sequelae to surgical procedures increases with age. Klug and McPherson (40), dealing with this problem from the physical aspect, reviewed 732 operations performed upon patients of 60 years or over. Wound infection, gastro-intestinal, pulmonary and cardiovascular complications occurred in 35 per cent. as compared to 23 per cent. of the control series comprising patients under 60 years of age. The complication rate for minor surgery was 11 per cent. in the elderly and 4 per cent. in the younger group. Stresses which would seem to have no influence upon the young may produce a profound psychiatric upset in the older subject (Robinson, 52). Physiological and psychic balance, precariously adjusted, would be exceedingly vulnerable to such factors as transitory episodes of vascular insufficiency and cerebral anoxia. Studies by Fazekas and his associates (25) and by Scheinberg, Blackburn, Rich and Seslaw (56) have demonstrated that there is a marked decrease in cerebral blood flow and increased cerebral vascular resistance in individuals over 50 years of age. These changes are more pronounced in persons with cerebrovascular disease than in controls of the same age without demonstrable vascular pathology. Corday *et al.* (15) introduced the term "acute cerebral vascular insufficiency". They demonstrated clinically and experimentally that sudden arterial hypotension can result in transient or permanent cerebral damage. Profound haemodynamic changes have been observed during surgery (Snyder, 61; Fletcher *et al.*, 27; Clowes *et al.*, 12; Dwyer and George, 22; Heilbrunn and Allbritten, 34). Using a variety of methods such as dye dilution or radio-isotope dilution techniques there is almost general agreement that a decrease in cardiac output takes place during general anaesthesia, although the degree cited varies from study to study. Hypotensive anaesthesia has been regarded as contra-indicated in the elderly by many workers (Enderby and Pelmore, 24; Bedford, 4; Gray, 30). However, in a recent article Rollanson and Hough (53) pointed out that many clinicians have employed hypotensive techniques in these people. In the literature reviewed by them a total of 490 cases were recorded with a gross mortality of 40, only 9 of these being associated with the anaesthetic technique employed. They concluded that mortality and morbidity would seem to be no greater with hypotensive than with normotensive techniques. It has been claimed that the procedure is safe provided the systolic blood pressure is maintained above 80 mm. of Hg. Bedford (4) in a stimulating paper challenged the advocates of hypotensive anaesthesia, commenting, "The onus lies heavily upon them to prove that their technique is free from risk; and here it is not enough to quote survivals, for the patient's mental state is also a matter of great moment both to himself and his relatives. Until such proof is forthcoming, this practice should be condemned."

The unfortunate patient's ageing cerebral tissue may be assaulted by other potent antagonists and Allison (2) has drawn attention to the importance of avoiding dehydration and mineral depletion. He considers that whilst the organic cerebral consequences of factors such as these are usually reversible, the effects of anoxia and hypoglycaemia are often irreversible, these being associated with cellular death.

Sturgis *et al.* (63) have presented a preliminary report of the patterns of behaviour during anaesthesia recovery in 12 patients having hysterectomy and correlated this with the speed and quality of post-operative convalescence. In their experience post-operative response has little direct relation to physical factors such as duration and extent of surgery or blood loss. Those patients showing disciplined control on emerging into consciousness progressed satisfactorily with no overt physiological or psychological complications. Those

who were in "a childish state of utter dependence, hostility and inability to co-operate" often had a stormy physical and psychiatric convalescence.

Alcohol and Metabolic Factors

Alcoholic excess appears to facilitate post-operative complications, both physical and mental, but this has already been adequately discussed by Lewis (42).

A very considerable volume of research is available on the endocrine and metabolic phenomena associated with surgery. Little is known, however, of the biochemistry of post-operative psychoses and Moore's (47) standard reference of over 1,000 pages on the metabolism of surgery deals with the psychiatric aspects in less than 20 lines and gives no reference to metabolic studies dealing specifically with this problem. There is known to be individual variation to stress in terms of endocrine and metabolic function (e.g. Bliss *et al.*, 6; Schottstaedt *et al.*, 57; Cohen and Silverman, 14) and it would, in many instances, be difficult to evaluate biochemical investigations carried out during a disturbed phase post-operatively, as a pre-operative base line would not have been established.

Psychogenic Factors

Apart from the psychological implications of surgery already examined in relation to cataract extraction other studies warrant consideration. In 1909 Kelly commented that a "history of prolonged worry and dread of operation is the most influential cause of post-operative mental disturbance". Da Costa (16), writing from the standpoint of the surgeon, commented on the combined effect of pre-morbid personality, fear of the operation and physical factors such as blood loss and sepsis in precipitating the disorder. Abeles (1) also stressed that no one factor is responsible and suggested that in many cases the operation only serves to bring to light a latent psychotic tendency and that fears of death and mutilation are significant factors. Ebaugh (23) cautions against inadequate or injudicious preparation. Ill-considered and tactless remarks can engender panic and fear. Bernard Meyer (46) has given a comprehensive account of the profound emotional implications of hospital admission. Titchener and his colleagues (64) have indicated that ageing patients who have lost the proximity and support of family, friends, or visitors developed a psychosis in response to stress of illness and surgery more often than those who retained close family contacts. Sheffer and Greifenstein (59) investigated 100 surgical patients by a questionnaire and 50 of them had, in addition, a psychiatric interview. Fear of what might be seen, heard or felt in the operating theatre motivated 43 per cent. to select general anaesthesia as their first choice if they could select the anaesthetic. The anaesthetist was regarded as an impersonal and distant figure who carried out his appointed task both skilfully and efficiently but without emotional impact on the patient. Denial of fear or anxiety in relation to the operation or anaesthetic operated as a defence mechanism in 62 per cent. of all subjects. Hackett and Weisman (32, 33) have recently discussed the psychiatric management of operative syndromes, this term being employed to describe the various psychiatric complications which can arise during the course of surgical treatment. They stressed the importance of support by the psychiatrist throughout the patient's stay in hospital.

Clinical Picture

The duration of the latent interval recorded between surgery and the development of psychic derangement varies from study to study, and Stengel (62) has noted that in 3 of his cases it was as great as 9 weeks. The fact that a schizophrenic or depressive psychosis develops in the third post-operative month does not imply that the operation was responsible, especially if there was a former history of a similar disorder. Such patients might have become disturbed even if surgery had not supervened and the longer the latent interval the more critical should be evaluation of the relationship.

Some authors believe that post-operative psychotic reactions have specific clinical features. Muncie (48) described 4 cases presenting with early fear, mistrust and depression later developing into elation and over-activity with fear very much in evidence. It has been suggested that this is an attempt by the patient, as a reaction to his extreme fear of death, to convince those around him that he is still alive. Cobb and McDermott (13) have pointed out that the clinical picture is not so much that of acute delirium with confusion and disorientation but rather that of a vague alteration in perception and mood. Washburne and Carns (65) describe the mental symptoms as comprising a manic type of reaction which may incorporate psychomotor excitement, delirium, delusions which are predominantly those of persecution, and also visual or auditory hallucinations. Lindemann (43) maintains that agitated depression is the characteristic response in women after lower abdominal operations. Feiling (26), however, emphasizes the non-specific character of the disorder, and Stengel and his co-workers (62) also could not support the existence of a specific clinical entity "post-operative psychosis". An interesting paper by Oltman and Friedman (49) has recorded that whereas the elderly presented with confusion, disorientation, increased motor activity, hallucinations and noisy unco-operative behaviour, the younger patients demonstrated "a state of acute catatonia, withdrawal and stupor indistinguishable from schizophrenia".

The Present Study

Material and Method

The purpose of this enquiry was to re-examine the association between surgery and severe psychiatric disturbance. Particular consideration was to be given to incidence, clinical manifestations, previous and family history of mental disturbance and the patient's subsequent history principally in relation to further surgery. Again, having been acquainted with a number of such patients admitted to the Department of Mental Health the role of psychogenic factors could be assessed. It was also postulated that electroencephalographic studies after recovery from the illness might show a high proportion of abnormalities. Kennard (39), for example, has reviewed a number of studies demonstrating that the electroencephalogram in patients having functional neurosis or psychosis is more frequently abnormal than in the so-called normal population.

It was felt that such an appraisal as has been outlined could readily be undertaken in this area for a variety of reasons.

(*i*) If psychiatric evaluation is indicated for any patient in the Belfast Hospitals administered by the Northern Ireland Hospitals Authority, referrals will be to either the Department of Mental Health in the City Hospital or to Purdysburn Mental Hospital. This has the very obvious advantage that leakage

is negligible, as compared with larger cities served by several psychiatric clinics attached to general hospitals and in addition a number of mental hospitals.

(*ii*) The population of Belfast is a relatively stable one and little difficulty was anticipated in contacting patients for follow-up purposes.

(*iii*) Patients might be more willing to attend for review, since the great majority would be living within a 5-mile radius of this department.

(*iv*) Statistics with regard to the total number of operations carried out in the Belfast area could be readily obtained from the Hospitals Authority.

(*v*) General hospital notes are conveniently available for perusal.

The clinical records of both psychiatric units were then examined for the 5-year period from 1 January, 1956 to 31 December, 1960. In this department there operates a coding system on a standardized item sheet, and such a search was therefore extremely simple and reliable. However, at present no such system is available in Purdysburn Hospital. The admission registers of this hospital for the stated period were then examined and note was made of all patients admitted on transfer from general hospitals, irrespective of psychiatric diagnosis. Each case record was then studied and patients appearing to fall within the compass of this study were selected. It then became apparent that the sample had to be further refined and the following categories were excluded.

(*i*) Psychiatric disturbance following brain surgery. One such patient, for example, had eventfully survived two previous operations for partial removal of a brain tumour. When a third and more extensive removal was undertaken there followed a severe confusional state.

(*ii*) Psychiatric disorder following Caesarean section, as such patients might be more appropriately considered in the group of puerperal psychoses.

(*iii*) Patients in whom, although admitted after surgery, the primary diagnosis was dementia. Several elderly persons had been admitted following various orthopaedic procedures for fractures but it seemed likely that the operation had little to do with their mental state. Probably families had been coping with a dementing but ambulant relative until physical illness had necessitated treatment in hospital, and on account of the patient's mental state post-operative care could not be provided in a general hospital ward.

(*iv*) A number of subjects were chronic hysterics, psychopaths or drug addicts and it was apparent that surgery had been dictated by the patients' mental state rather than being directly responsible for it.

Using these criteria, a total of 36 cases were traced in the two departments during the 5-year period.

Each patient was then contacted by letter and asked to attend, being told that the interview was requested only for research purposes. Before each interview the appropriate general hospital records were studied.

Results

Incidence

Excluding maternity and paediatric services there were 57,600 major operations performed in this area over the 5-year period under review. The incidence of severe psychiatric disturbance following surgery was therefore 1 in 1,600 operations. It was considered that in some instances a patient could develop a severe mental disorder attributable to surgery after discharge from

hospital, especially if his post-operative stay was brief, and admission to the mental hospital would then be from home. In view of the method of collecting material in this enquiry such cases would not be detected. To further explore this possibility 600 case records of admissions during the period of study were selected at random and examined. In no instance did surgery appear to be a contributory factor and it was evident that any leakage in this manner could be regarded as negligible.

Age and Sex

The series consisted of 15 males and 21 females and ages ranged from 26 to 70 years, the average being 48·8 years (males, 47·9 years; females, 49·6 years). Distribution according to age is presented in Figure 1 and the greatest proportion of cases is noted to be amongst the 41–45 year olds. In such a small series no valid conclusions regarding age and sex distribution could be entertained. The sex difference might be explained if more females were undergoing surgery, but in two surgical units with equal distribution of beds to each sex there was approximately the same number of operations on both groups over a two-year period. The same might apply to the age factor but also from these units there was no evidence that the 41–45 group constituted the greatest percentage of admissions. In fact, surgery was almost twice as common in the two groups from 46 to 55 years of age.

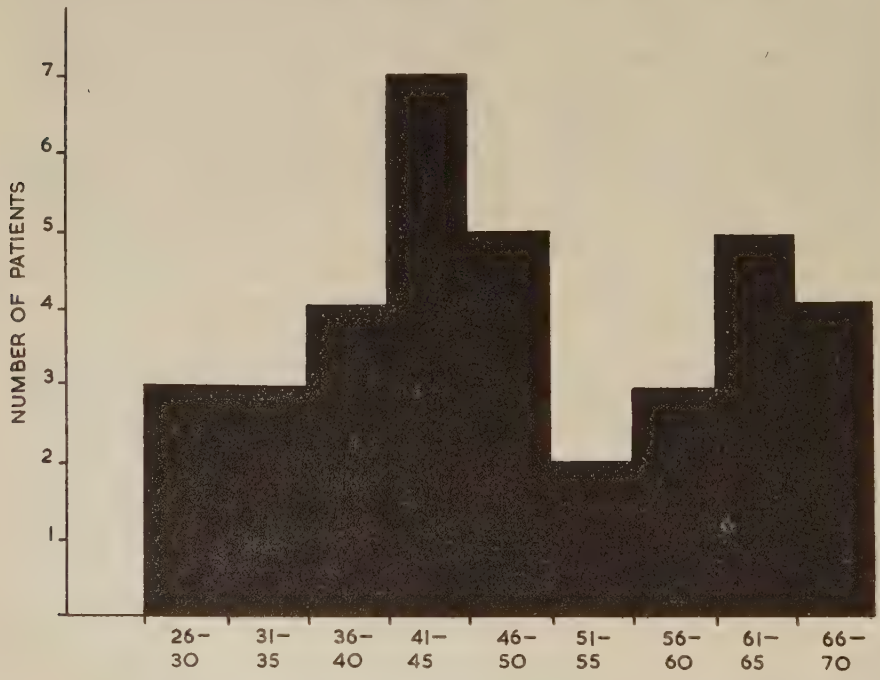

FIG. 1.

Site of Operation

Table I summarizes the sites of operation. Notable features are the high representation of mitral valvotomies and the fact that hysterectomy was regarded as contributory in only one case. Unfortunately precise figures for the

frequency of each operation are not available, but it seems likely that hysterectomy is a more common procedure than valvotomy. However, the high incidence of severe psychiatric disturbance following heart surgery which has been cited by various authors cannot be supported by observation in this area. The records of 50 consecutive patients having mitral surgery from this hospital have been closely studied and a further 30 patients have been seen before and after surgery for detailed psychiatric assessment. In only one of those patients studied retrospectively has a severe psychiatric complication occurred post-operatively. Of the 30 subjects examined in more detail one patient had a mild confusional episode lasting 48 hours. However, other reactions, particularly hysterical, are not uncommon. The abdominal operations noted were variously repair of perforated duodenal ulcer, repair of traumatic rupture of the bladder, ileostomy, colostomy, colectomy and choledocho-duodenostomy. Apart from hysterectomy the gynaecological procedures were for salpingectomy and oophorectomy, uterine suspension and cervical biopsy.

TABLE I

Sites of Operations

Operation	M	F
Dental procedures	2	–
Ear	–	1
Thyroid	–	1
Breast	–	2
Lung	1	–
Heart	2	5
Aorta (embolectomy)	–	1
Sympathectomy	–	1
Stomach	2	–
Gall bladder	1	1
Intestinal	1	3
Other abdominal	3	1
Hysterectomy	–	1
Other gynaecological	–	3
Excision pilonidal sinus	1	–
Haemorrhoidectomy	1	–
Orthopaedic	1	1

Clinical Picture

The following types of psychiatric disturbance were noted:

Confusional states	12 cases
Schizophrenia	9 cases
Depression	13 cases
Mania	2 cases

The clinical presentation did not seem to differ from that occurring in persons where surgery is not a factor. Six patients had post-operative physical complications. A 33-year-old woman who had mitral valvotomy developed pyrexia of 100–101° F. and had a small subconjunctival haemorrhage. No definite evidence of subacute bacterial endocarditis was found, but it was felt that in view of the fever she must be treated as such. She was therefore given a course of terramycin and streptomycin and was responding satisfactorily when transferred to a psychiatric unit with a confusional state. A similar mental disturbance appeared after aortic embolectomy in a 53-year-old woman.

Anuria was a complication after surgery, but this had responded to treatment before delirium developed 10 days post-operatively, Dehydration appeared to be significant in precipitating confusion in another subject having had an ileostomy for ulcerative colitis. Another presenting with an acute delirious state 10 days after valvotomy had had a small cerebral embolus within a few hours of surgery with transient facial paresis but otherwise no physical complications were evident. Two patients developed pyrexia up to 101° F. related to pulmonary infection and a stitch abscess, but these were responding to chemotherapy when transfer was necessary. There was no evidence in any case that the anaesthetic was directly responsible for the psychosis. However, in many records comment was limited to the type of agents employed and in some instances even this was not indicated. It seems likely that in a long and busy operating session anaesthetic difficulties might not be remarked upon in the clinical notes and therefore such notes would not reliably indicate anything less than severe complications of anaesthesia. Alcohol consumption at least in moderate amounts and for some years was admitted by 6 persons and 5 of these presented with confusional states.

In a number of cases psychogenic factors seemed important but their precise significance is uncertain. Similar factors would seem to operate in many instances but few develop severe psychiatric disturbances. A few examples may be outlined.

M.N. (male, 32 years). Presenting with flatulence and mild abdominal discomfort he had been surprised when told that cholecystectomy was indicated. It was his first admission to hospital. After waiting 6 days for operation he had been told that it could not be undertaken for several days and was allowed home for 1 week. He was very apprehensive on the morning of the operation and then after pre-medication he was advised that as several emergencies had been admitted a further delay of several hours was indicated. He was in a state of considerable anxiety when brought to the theatre. Within 24 hours of his operation a patient died in a bed nearby. Mr. M.N. described how he "felt terrified" by this and seemed to be in "a very bad dream". A confusional state developed and necessitated psychiatric management.

F.M. (female, 44 years). She complained that when told valvotomy was indicated "it seemed the world had come to an end—it came as a great shock for I thought the operation was the last thing in the world for me—a neighbour told me it was far too serious an operation". Immediately after surgery, not expecting to feel so unwell, she concluded that it had not been successful and became extremely apprehensive, anticipating that death was imminent.

B.E. (female, 63 years). Moderately confused following ileostomy she had been screened from other patients. Thus she was deprived of the visual perceptual cues of routine ward activity and this seemed to increase the degree of confusion.

Latent Interval

In 7 cases, all depressive illnesses, the precise interval between surgery and development of psychiatric symptoms could not be established but in all instances they appeared within a few days or weeks. As could be anticipated the onset of mania, confusional states or schizophrenia can often be more precisely noted, and in all patients falling within these diagnostic categories the latent interval was clearly defined in general and mental hospital notes. Table II presents the interval between surgery and the onset of psychiatric

TABLE II

Interval between Operation and Onset of Psychiatric Symptoms

Latent interval	0–24 hours	–3 days	–5 days	–10 days	–2 weeks	–5 weeks	–8 weeks
Number of patients	4	5	2	8	6	3	1

symptoms. In 25 cases, approximately 70 per cent. of the total, the psychiatric illness began in the first 2 weeks of the post-operative period. Table III indicates the latent interval in relation to each diagnostic category and it will be noted that whilst all confusional states appeared within 2 weeks of surgery the latent period in schizophrenic and especially affective illnesses was more variable.

TABLE III

Latent Interval and Type of Post-operative Mental Disorder

Latent interval	0–24 hours	–3 days	–5 days	–10 days	–2 weeks	–5 weeks	–8 weeks
Confusional states	2	3	2	1	4	–	–
Schizophrenia	1	1	–	4	2	1	–
Depression	1	–	–	2	–	2	1
Mania	–	1	–	1	–	–	–

Duration of Stay in Hospital Pre-operatively

It was postulated that those patients who developed severe psychiatric disorders post-operatively might have spent a shorter time than usual in hospital before surgery and, having less opportunity to become familiar with their surroundings, be more liable to become disturbed. Four (11 per cent.) patients were emergency admissions and of the others the duration of stay in hospital prior to surgery varied from 1 to 55 days with a mean of 8·2 days. The records of 100 surgical patients selected at random indicated that 14 per cent. were emergencies and in the remainder the duration of stay in hospital prior to operation varied from 1 to 20 days with a mean of 6·1 days. It therefore could not be established in this series that the patients under review had less preparation in terms of time in hospital pre-operatively.

Previous History of Nervous Illness

There was no evidence that any patient was mentally ill just prior to surgery but 4 had a previous history of psychiatric illness. A 32-year-old male who presented with an acute schizophrenic reaction had received deep insulin therapy 5 years earlier. A 63-year-old woman transferred post-operatively with a toxic confusional state had a depressive illness some years before which responded to E.C.T. Two women presented with similar disorders to those experienced 19 and 10 years previously following childbirth.

Six (17 per cent.) patients were noted to have had previous surgery and in each instance uncomplicated by psychiatric disturbance. Of a control group of 100 surgical patients 23 per cent. had been operated upon before.

Family History of Psychiatric Illness

Eight patients (22 per cent.) had a family history of mental illness necessitating psychiatric management. Of 3 patients presenting with schizophrenic reactions two had siblings whose records showed that they also had had schizophrenic illnesses. In a sister of the third a diagnosis of depression had been made. Of 3 patients having confusional states one had a schizophrenic son but in the others the relatives' clinical notes could not be secured and diagnoses were not established. A patient experiencing post-operative depression had a mentally defective child whilst the mother of another was dementing. Only 5 of 78 patients (6 per cent.) who had survived valvotomy uneventfully

admitted that a member of their family had required treatment in a mental hospital. Thus a family history of mental illness was almost 4 times as common in those having post-operative psychoses as in those having no severe psychiatric disturbance following mitral surgery. The difference to be observed in the frequency is significant at the 5 per cent. level, that is a difference as wide as this would be expected to occur by chance less than 1 in 20 times.

Subsequent Medical and Psychiatric History

It was not possible to trace 9 patients at the addresses given in hospital records and this may be related to the current tendency to move into new housing estates. A further 2 patients had died, one from carcinoma of the pancreas and the other following acute intestinal obstruction. Four did not attend or reply to our communications. Two replied stating that they could not be present because of domestic and business commitments but said that they had remained well since discharge. It was therefore possible to arrange for only 19 patients to attend for review. The time from operation to interview varied from 9 months to 5 years with an average of $2\frac{1}{2}$ years. Sixteen had remained well. Only one patient had required further surgery in the interval—an epididymectomy, and the post-operative period was uneventful. A woman of 33 years who had had an acute schizophrenic disorder after valvotomy had a similar psychiatric disturbance following childbirth 18 months later and again required in-patient psychiatric treatment. Two others, having had schizophrenic reactions, required readmission. One had an exacerbation of symptoms, whilst in the other the clinical picture was now mainly depressive and responded to E.C.T. Unfortunately, on account of the large number of non-attenders, no valid conclusions are possible regarding the fate of these people as a group.

Electroencephalography

Each patient agreed to have an EEG and the results are presented in Table IV. Each record has been analysed in terms of the wave forms alpha, theta and beta. No patient admitted to having drugs. Three females were still menstruating regularly and in each case the period had occurred 1–2 weeks previously. Only 4 records (21 per cent.) could be regarded as normal. However, in 12 cases (63 per cent.) the tracing could be considered as only mildly abnormal. Nevertheless, it may be that such findings reflect a basic instability rendering these individuals more liable to post-operatively psychotic breakdown.

Discussion

It must be stressed that this report deals only with post-operative psychotic disorders of such severity as to warrant management in a psychiatric unit. Milder disturbances are much more common. The frequency of severe disturbance was found to be 1 in 1,600 operations and this estimate is substantially in agreement with Lewis' observation (42). It is understandable that most physicians and surgeons should press for transfer of very disturbed subjects and it seems unlikely that many cases have been lost from this series through having been nursed through the psychotic phase in general wards. The incidence as found in this study is in contrast to the estimates of 1 in 250 or 400 operations quoted by others (16, 38). However, these reports were published several decades ago and since that time there has been considerable progress in both anaesthetic technique and post-operative care. Antibiotics are available as a therapeutic and

TABLE IV

Summary of EEG Findings in Patients having had Severe Psychiatric Disturbance Post-operatively

No.	P.T.	Age	Alpha (α)	Theta (θ)	Beta (β)	Conclusions
1.	W.G.	47	11–13 c/s	5–7 c/s increased by hyperventilation.	—	Mild instability increased by hyperventilation.
2.	G.C.	61	8–11 c/s	Occasional at 7 c/s	—	Within normal limits.
3.	J.M.	41	9–13 c/s	Occasional at 7 c/s	—	Within normal limits.
4.	A.P.	66	8–10 c/s	Excess at 4–7 c/s	Low voltage at 18–20 c/s	Unstable — Increased by hyperventilation.
5.	M.B.	28	11–12 c/s	Occasional at 6–7 c/s increased by hyperventilation	—	Mild instability in response to hyperventilation.
6.	J.M.	49	8–11 c/s	Occasional at 6–7 c/s increased by hyperventilation	Low voltage at 17–19 c/s	Mild instability in response to hyperventilation.
7.	N.M.	32	9–11 c/s	—	—	Normal.
8.	E.L.	46	8–13 c/s	—	Excess at 16 –19 c/s	Very mild abnormality in view of excess fast activity.
9.	E.B.	63	8–10 c/s	5–7 c/s	—	Mild instability.
10.	F.T.	35	9–12 c/s	—	17–18 c/s	? mildly abnormal in view of fast activity.
11.	V.S.	57	8–10 c/s	5–7 c/s with hyperventilation 4 c/s	—	Mild instability increased by overbreathing.
12.	S.M.	52	9–11 c/s	—	—	Normal.
13.	A.B.	47	8–12 c/s	4–7 c/s. Lambda on eye opening	—	Moderately abnormal in view of amount of theta.
14.	J.A.	44	8–9 c/s	5–7 c/s on hyperventilation—mainly anteriorly	—	Mild instability to hyperventilation.
15.	J.M.	58	9–13 c/s	5–7 c/s increased by hyperventilation	—	Mildly abnormal and unstable. Instability increased by hyperventilation.
16.	T.H.	65	Little at 8 c/s	7 c/s. Dominant. Occasional 4–5 c/s	—	Abnormal. Low frequency dominant.
17.	M.F.	47	8–11 c/s	5–7 c/s. Increased by hyperventilation	15–23 c/s	Unstable. Increased by hyperventilation. Also mildly abnormal in view of fast activity not within limits of normal cortical.
18.	E.R.	40	9–11 c/s	7 c/s increased by hyperventilation (5–7 c/s)	—	Very mild instability to hyperventilation.
19.	F.B.	55	8–12 c/s	6–7 c/s	—	Mild instability.

prophylactic measure and there is an increasing awareness of the necessity for maintaining electrolyte balance. Importance must also be attached to the tendency to have the patient up and about as soon as possible. The discovery of the phenothiazines has been a further major therapeutic advance. Hospital staff having little or no experience in coping with major psychiatric disturbances are liable to become apprehensive when faced with such a situation. Their anxiety, in turn, reflects on the patient, sedation may be employed unwisely and as a measure of desperation, the patient may become more disturbed and thus a vicious circle is established. Carefully considered exhibition of a phenothiazine rapidly controls motor restlessness and such a state of affairs may be prevented.

Mitral valvotomy was found to be highly represented and it may be that the very considerable and peculiar psychological significance of cardiac surgery in addition to the magnitude of the procedure involved are important factors. Nevertheless, this study cannot support the high psychiatric morbidity quoted in other studies (5, 28, 37).

It was evident that post-operative mental disturbances have no uniform clinical presentation and confusional, schizophrenic or affective disorders can all occur. Six patients (17 per cent.) had physical complications following surgery but Klug and McPherson (40) have pointed out that such complications occur in 23 per cent. of persons under 60 years of age in the post-operative period. In none of the patients in this series could the anaesthetic be regarded as a primary causative factor. However, this claim is based on the assumption that, as the clinical notes did not comment on any complications of anaesthesia, no such complications occurred.

The role of emotional factors cannot be adequately assessed in any study which is largely retrospective, but in some cases they appeared to be relevant. As has already been pointed out, some degree of emotional disturbance is present in many patients awaiting surgery—for few can anticipate it with complete equanimity—but only a very small proportion becomes overtly disturbed post-operatively.

The conclusions which can be drawn from this study are limited but neither duration of stay in hospital before operation nor previous experience of surgery appeared to be significant factors. It does not follow that these could not be of considerable importance in an older and less readily adaptable age group.

Constitutional predisposition is suggested by observations on family histories. A more acceptable control group would have been general surgical patients rather than a series all having the same procedure—namely valvotomy. It could be argued that surgical procedures are sometimes employed in the treatment of what might be regarded as psychosomatic illnesses. Thus, there might be a higher family incidence of psychiatric disorder in a general group than in the group of patients here used for comparison. However, in the series, there were only 6 patients having surgery for illnesses which might be emotionally determined—peptic ulceration, thyrotoxicosis, and ulcerative colitis. One such patient had a positive family history. Again, if a surgical patient is approached in brief interview and questioned regarding a family history of mental disorder by a doctor he has not previously seen, it is unlikely that he will be forthcoming. The mitral group are the subject of a detailed study being undertaken at present, each is interviewed on several occasions, a better rapport is established and accordingly their statements may be regarded as more reliable.

Further support for constitutional predisposition is offered by EEG

findings, but obviously appraisal of a much larger number of subjects is indicated to allow of valid conclusions.

Summary

A review of studies relating to severe psychiatric disturbance in the post-operative period has been undertaken. Various aspects of this disorder as it has presented in the Belfast Hospitals over a 5-year period have been discussed. Incidence has been estimated as 1 in every 1,600 surgical procedures. Valvotomy was highly represented but this study could not support the observations of other workers with regard to frequency. Neither could this investigation support the suggestion that a distinct clinical entity "post-operative psychosis" exists. Duration of stay in hospital pre-operatively was not regarded as being a significant factor. There was evidence of constitutional predisposition and it would seem that physical or psychogenic factors operating in such people may precipitate a disturbance following surgery.

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DECONDITIONING AND TIME-THERAPY

By

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In view of the recent revival of interest in deconditioning, the treatment of a series of 35 cases of anxiety by this method may be of interest. This series has not been recorded previously although the treatment was carried out 20 years ago.

With great detail, Freeman and Kendrick (1960) have described the immediate cure of a case of cat phobia by conditioning, and Eysenck (1960) has reviewed the literature and dealt with the methods used. He refers to five types of conditioning therapy (*a*) Physical manipulation of the environment, e.g. removal of the offending substance; (*b*) Aversion therapy, i.e. the joining of the symptom to punishment and consequent avoidance of the symptom; (*c*) Positive conditioning; (*d*) Conditioned inhibition, i.e. practice of an activity setting up a fatigue-like state of inhibition, which ceases during rest periods; and (*e*) Reciprocal inhibition, i.e. the formation of a conditioned response antagonistic to the symptom.

The present paper deals with deconditioning by means of the last three methods. Examples will later be given of each.

The series of cases consisted of 49 serving soldiers, referred by medical officers on account of objective signs of excessive anxiety, either based on experiences during action in the British Expeditionary Force and its evacuation to this country in 1940 or during the dangers of air-raids. Of these, 6 showed no objective signs whilst in hospital and have been omitted from this investigation, whilst 8 underwent less than 5 stimuli, a figure arbitrarily selected as the minimum for study.

The deconditioning treatment consisted of undergoing the stimuli which gave rise to the anxiety, i.e. danger, in this case due to air-raids. The town in question, Plymouth, suffered from severe raids, the *Spectator* remarking of it on 2 May, 1941, that "whatever the reason, the result is a greater concentration of destruction than has fallen on any other city in England". By the end of the year 1941, 1,073 civilians had been killed and more than 50,000 houses had been damaged. On 2 nights in March, 1941, the estimated number of enemy planes engaged was 250, and in 5 nights of April of the same year, the figure was 750 (*Front Line*, H.M.S.O., 1942). Stoke Military Hospital, Devonport, to which the patients were admitted, was about 10 minutes walk from the Royal Naval Dockyard, an obvious enemy target. In consequence of these circumstances, an excellent opportunity existed to accustom the patients to danger.

Methods

Records were kept of the dates and times of the air-raids, numbering 210, from 16 October, 1940 to 8 May, 1941. These raids took place frequently, there being 38 in October, 43 in November, 13 in December, 18 in January, 27 in February, 27 in March, 33 in April and 11 to 9 May.

During each raid, notes were made under the headings of bombs falling, heavy gunfire, gunfire, slight gunfire and no gunfire. These headings referred

to the sound in the wards and not to the actual occurrences in the surrounding town. That no exaggeration has occurred in these reports is seen by comparison with the official accounts of the dates of 7 heavy raids (*Front Line*, 1942) only 6 being recorded as heavy, one as slight. In deconditioning therapy, the appearances of the stimuli to the patient are important, not the actual occurrences.

The patients were admitted to a ground-floor ward of 8 beds. The walls were of thick stone with windows high up on one side only. As no air-raid shelters existed in the hospital grounds, the patients remained in this ward throughout the raids. As the patients' fear decreased they were transferred to a ward on the top, second, floor with windows on 3 sides. Whilst here, they were allowed, whenever they wanted, to descend to the ground floor ward during raids.

At the commencement of the raids, a few cases were noticed to show less fear progressively, as the number of raids through which they passed increased. From these casual observations, a plan was organized for constant records of the patients suffering from severe fear due to external danger, whether based on conscious or unconscious guilt. Records were made of the patients' objective signs by the psychiatrist and staff under the headings of severe fear, moderate fear, no fear or asleep. Although the sound of gunfire may have reached the unconscious in those asleep, the records relating to the patients who were asleep during raids have been omitted from this investigation. In order not to be inaccurate and to avoid being misled, subjective statements were ignored. In addition, the vast majority of persons felt fear during raids, although they showed no objective signs to any great extent.

Objective signs especially noted were tremor, weeping, standing in a corner, lying under the bed, placing the head under the pillow, running downstairs, lying on top of a cupboard (i.e. as in a cave) and general excitement. Additional signs reported by Brend (1941) are vomiting, hyperhidrosis and frequency of micturition. Sargant and Slater (1940) reported a Parkinsonian condition. Diarrhoea, so common in other causes of anxiety, e.g. examinations, was not a feature of the present series.

Brend (1941) drew attention to the cases who showed accentuation of the normal response to danger. The reaction is likely to be re-evoked when the stimulus is repeated in milder form or even when there is only a threat of it. In these cases, the symptoms are conditioned reflexes.

One patient of this series showed the excessive dependence upon the family described by Sutherland (1941). He was distressed that he was so far away from his home and relations. He wished to impress that he was "nervous" only when alone.

Men often lay under their beds during raids. In one instance, 3 men were on the floor during the whole of a severe raid. During the next night, an even heavier raid took place, but after about $1\frac{1}{2}$ hours of lying on the floor, 2 of the patients rose and lay on the tops of their beds.

Results of Treatment

Of 35 patients who, on admission to hospital, showed objective evidence of fear during one or more raids and who passed through at least 5 raids, 16 showed decrease of their objective signs. In 19, no change was observed and in none was an increase present at the end of treatment.

Of the patients who improved, 3 underwent heavy gunfire after the beginning of their improvement without deteriorating.

Although hypnotics were administered, no analysis, conscious suggestion or hypno-therapy was used. As those asleep during raids were not included in the investigation, the use of hypnotics would have no material effect upon the results.

Table I shows the number of raids through which the patients passed without deterioration subsequent to the initial improvement.

TABLE I

Numbers of Raids in which Improvement was Maintained, with Relapses

Improvement After	No. of Cases	Raids with Maintained Improvement
2 raids	1	2
3 raids	1	20+ relapses in 9 raids
4 raids	3	2 0 0
5 raids	3	2 4+ relapses in 4 raids 8+ relapses in 1 raid
7 raids	2	3+ relapses in 1 raid 5
9 raids	1	4+ relapses in 2 raids
10 raids	1	2+ relapses in 1 raid
11 raids	1	2+ relapses in 4 raids
22 raids	1	19+ relapses in 1 raid
33 raids	1	8
61 raids	1	7+ relapses in 3 raids

Although only 5 cases showed no relapses, that the cases showed a change for the better is seen when the proportion of the occurrences of objective fear before improvement is compared with that after the initial improvement. Of 164 patient-raids before improvement took place, objective fear was seen in 65·2 per cent., but of 123 patient-raids following the initial improvement, it occurred in only 30·1 per cent.

Table II shows that improvement when only the greatest stimuli are considered is less than when all stimuli, or all degrees of gunfire, are considered. This difference is unlikely to be due to time-interval between the heavy raids as no relationship could be found between improvement and interval between raids in 622 intervals varying from 30 minutes to 16 days in length.

TABLE II

Improvement Rates to Different Stimuli

	Patients	Improved	No Change	Worse
Raid warnings*	36	16 (46%)	19	0
All gunfire	19	9 (47%)	7	3
Heavy gunfire	13	2 (15%)	9	2

* With or without gunfire.

Harrisson (1941) reported that the most upsetting process was a long series of raids or very intermittent raids with long lulls between, so that conditioning does not take place. The findings in the present series do not support this. Over

14 days, 4 patients were observed in from 34 to 39 raids each. In each case, more raids were accompanied by fear during the first week than during the second so that the series of raids during the first week, from 21 to 24 did not upset the patients during the second week. The total reactions were, in the first week 50 fear and 41 no fear observations and, in the second week, 20 fear and 38 no fear recordings. Notes on 2 men undergoing raids with the 17-day interval showed that more fear reactions occurred before the 17-day interval than following it in both patients. The total figures before the interval were 16 fear and 2 no fear observations, and after the interval, 5 fear and 4 no fear records, showing that a long lull had not upset these 2 men.

The reason for the difference in the improvement rate between all degrees of gunfire and only heavy gunfire must be that the greater gunfire was too great a threat of danger for conditioning to take place as readily as with lesser degrees of noise.

Loss of response is exemplified by a patient who showed fear during 13 of 15 raids but only once during the subsequent 20 raids.

Conditioned inhibition is seen in a patient who showed fear in 19 of 21 raids in 7 consecutive days but showed no fear in 16 of 25 raids in the subsequent 14 days. This period of 14 days was a relative period of rest, the raids being only one half as frequent, and the inhibition dissipated, fear again reappearing during the consecutive 5 days in 13 of 14 raids. Inhibition again occurred, no fear being observed in all of 7 raids during 7 days. In this case, 3 raids a day appeared to be necessary to produce fear. This case is a good example of the practice of an activity setting up a fatigue-like state of inhibition in spite of a continuation of a less frequently-repeated stimulus.

Reciprocal inhibition was demonstrated by a man who showed fear and went downstairs from the top floor in each of 8 raids. In the 9th raid, he showed fear but remained upstairs. In only 1 of the subsequent 10 raids was fear observed. In this case, the conditioned response antagonistic to the symptom was to remain upstairs, resulting in an increase of self-esteem.

The emergence of a conditioned reflex as noted by Brend is seen in the case of a man who underwent 17 raids and whose response to those without gunfire was nil in the first 4, but moderate in the next 2, following heavy and slight gunfire. Following the first heavy gunfire to which he responded with only moderate fear, he responded with severe fear to each of 2 raids with slight gunfire and one raid of heavy gunfire. The responses increased although the stimuli were constant in the instance of no gunfire, and the responses also increased although the stimuli decreased from heavy to slight gunfire.

The possibility of improvement being due to the passage of time must be considered. In one case, an amnesia occurred following the explosion of a bomb 8 yards distant. The officer had time in which to kneel down, but he was struck on the back by the blast, but not injured or concussed. For some 10 days he was unable to recall what he had been doing for a few seconds before the explosion, but by about the 14th day, the amnesic gap had been filled in without any conscious effort on his part. During the period of recovery of memory, he was not undergoing raids, but was in a raid-free area so that deconditioning could have had no part in the recovery.

Another case also demonstrated improvement without treatment during the passage of time but of a greater length, approximately 12 months in duration. A pilot, after being shot down when flying in the First World War, suffered from nightmares of falling for about one year only, although he continued to fly for 2 years after the end of the War. He began flying again during the Second

World War, including operational flights, but no nightmares recurred, although he broke down with headaches and diarrhoea without nightmares during severe stress at Flying Control Duties in a raid-free area (Gibraltar).

These cases show that symptoms due to fear can cease without treatment during the passage of time. The length of time may be short or great. Consequently, it follows that any treatment may be unnecessary for the resolution of the symptoms. Of the cases of this series, all were sent by medical officers to the psychiatrist on account of marked and persistent fear. Yet, by the time they had been admitted to hospital 6 of the 49 (or 12 per cent.), showed no signs of fear. These had presumably improved through the passage of time in spite of being admitted into a dangerous situation.

The fact that no patients became worse, although they continued to undergo dangerous stimuli, suggests that the signs of fear are not cumulative. If improvement were due to the passage of time only, then as each new equal stimulus occurred the response should be less, as each stimulus would be removed further from the onset of the fear. As this was not the case in the patients who failed to improve and in few who did improve, it appears that the improvement was not due, at any rate solely, to the passage of time. In fact in 3 of those who improved, the intensity of response to similar stimuli remained the same over as many as 7, 10 and 14 days respectively. Some form of deconditioning had taken place.

Summary

This treatment demonstrates that the signs of fear were reduced and abolished during repetitions of the fear-producing stimulus. This, of course, is a well-known principle of daily life, such as in learning to drive.

No relationship between interval between stimuli and the response to them was found.

Of 35 cases undergoing repeated stimuli, 16 improved in that their fear was reduced. No patient became worse. No psychotherapy, either analysis or hypno-therapy was used, but hypnotics were given at times. As patients when asleep have been omitted from this investigation, the administration of these preparations would not materially affect the results.

Cases are described of improvement over short and long periods of time, without treatment.

Consideration is given to the causes of improvement, the conclusion being reached that deconditioning to danger can produce improvement in the physical signs of fear.

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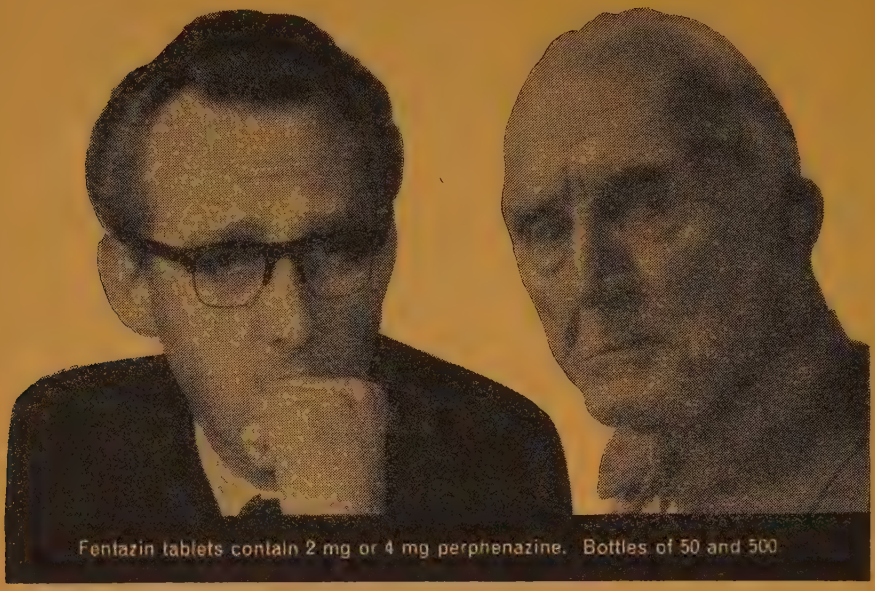

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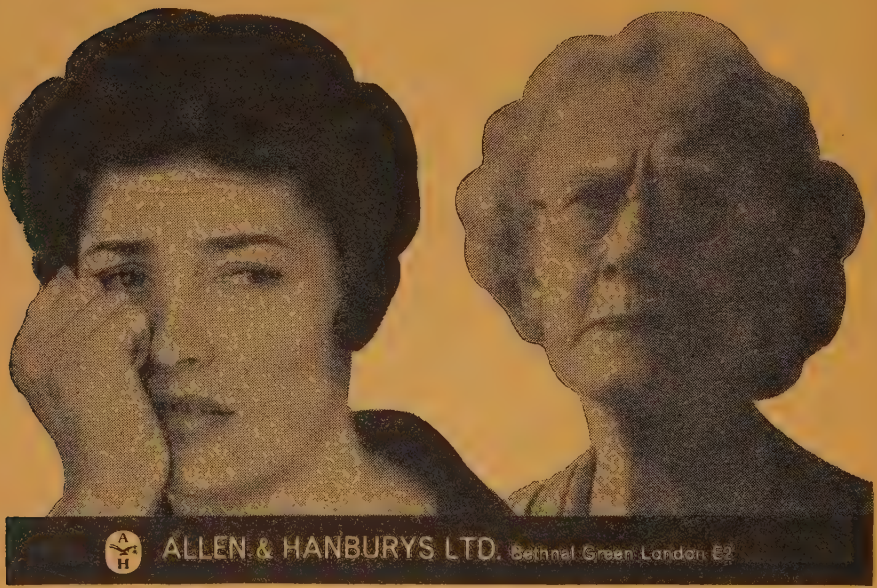

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